The Pennsylvania Main Line Canal

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THE PENNSYLVANIA MAIN LINE CANAL

By

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and

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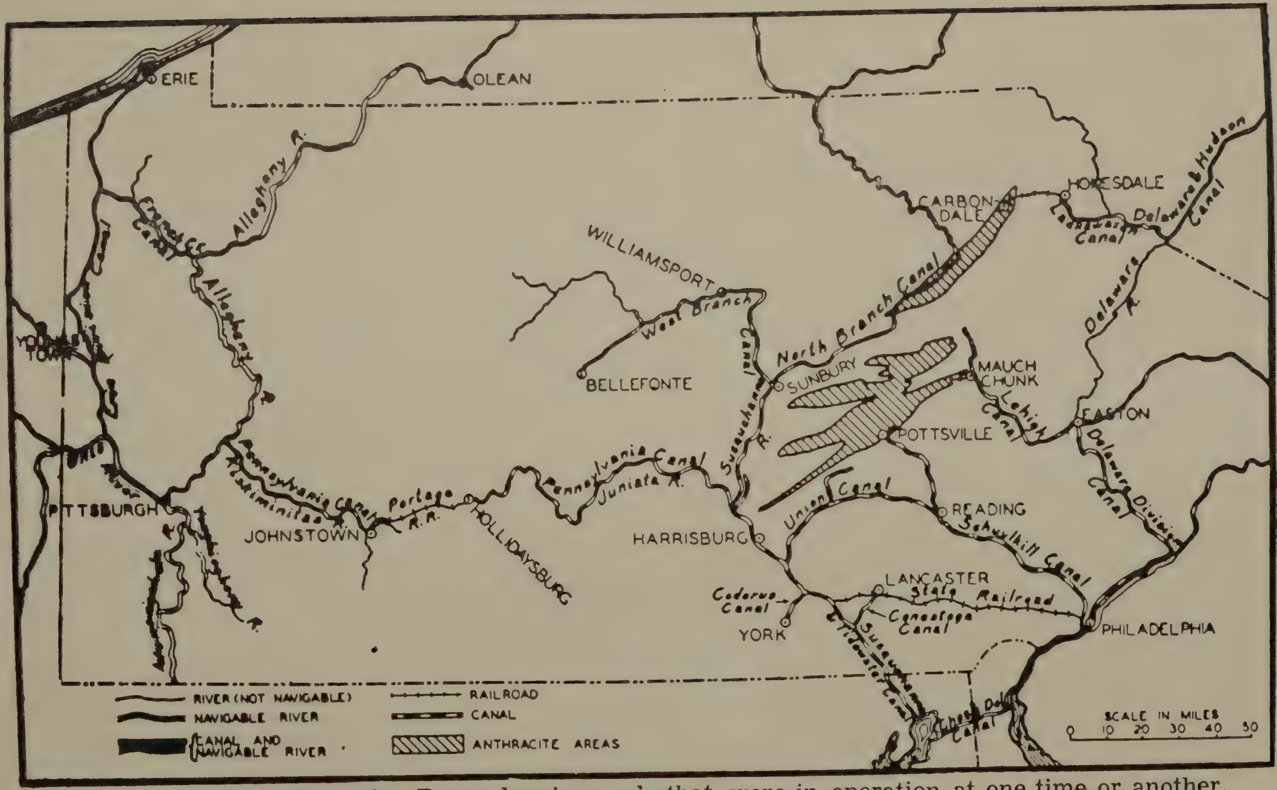

Map showing all of the major Pennsylvania canals that were in operation at one time or another.

INTRODUCTION

Pennsylvania had at one time and another approximately 1,250 miles of canal connecting almost all sections of the state in extensive freight and passenger activity. The last of its canals, the Lehigh, fell into disuse in 1942. It is over fifty years since any part of the Pennsylvania Main Line saw traffic; few people still living had any direct connection with this form of transport. There does still exist, however, an organization known as the Pennsylvania Canal Boatmen's Association, whose members, rapidly dwindling, hold enthusiastic annual reunions at Port Treverton on the Susquehanna River. Though many interested persons attend these meetings "by courtesy", as it were, there are now fewer than forty members of the Association who actually as boys and young men worked on the canals, and in a few years there will be none. Canal traditions, once flourishing and full of meaning to the hundreds of canal communities throughout the state, will then be dead.

Yet at present the few survivors from canalling days are extraordinarily informed folk, full of vivid, detailed, and accurate memories, remarkably unromanticised, of persons, places, operations, and lore connected with the canals; folk who respond delightedly to the rare opportunities that come their way to talk about the long-past canal life. An hour with any of them provides convincing evidence that canals were once a significant and memorable aspect of the life of hundreds of thousands of Pennsylvanians who were in direct contact with either canal operations or the canal routes.

The survivors of Pennsylvania's canal days, however, are not disappearing as rapidly as the direct evidences of the canals themselves. At present there are few visible traces of that Pennsylvania Main Line which, beginning in 1834, extended from Pittsburgh on the Allegheny to Philadelphia on the Delaware, some 400 miles. Much of it was filled in during the early days of the railroads, the rails laid directly over the buried canal bed. Other sections were obliterated later for highways. Aqueducts were burned down or blasted apart, and formidable locks knocked to pieces for fill. Where, by the chance of being inaccessible or otherwise useless, sections of the canal were allowed to remain undisturbed, they are now heavily overgrown and in the course of nature partially filled, so that, in the absence of water, only an experienced eye can detect in an otherwise normal landscape the once familiar configuration of towpath, canal bed, and berm.

Most of these vestiges are to be found in secluded and attractive countryside, near or along rivers, and would make perfect park or recreational areas with a minimum expense for maintenance. There is no country walk quite like a disused towpath.

That the canal bed itself should have gradually merged with the landscape was to be expected. Most of man's rearrangements of the actual earth, once they are abandoned, flow quietly back into their original forms. Nature fills up depressions more slowly than man, though with a finer hand. But that the stonework, masonry, and other structures of the canal should have been willfully destroyed, wholly or in part, or used as catch-alls and refuse dumps, is, to say the least, odd among a people who have a passion for reconstructing and sentimentalizing the past, for collecting antiques, and for making facsimiles.

Canal locks and aqueducts have been looted of their stone facings to supply the foundations of bridges, barns, and even churches. A handsome lock on Duncan's Island, still standing in isolation behind a roadside fruit stand and a cluster of houses, is full almost to the brim with garbage and rubbish. The man who sells the imported bananas and oranges was unable to direct the writers to this landmark ten yards behind his stand. A row of three rough-stone locks on a farm near Lockport, in Mifflin County, has mostly fallen into rubble. Two beautifully constructed large locks, one at Old Ferry on the Juniata and the other on the south bank of West Mahantango Creek up the Susquehanna, both of them admirable pieces of masonry in almost perfect condition and in enchanting settings, are completely hidden from the highway and overgrown with large trees, weeds, and poison ivy. They are enjoyed exclusively by small animals and birds, who still know a fine retreat when they see one. The magnificent stretch of the Susquehanna from Clarks Ferry to Northumberland, which the canal once followed up the west bank and along which there were 11 locks in addition to aqueducts, basins, and other canal structures, has recently been made more efficient, if not embellished, for the traveler by a 3-lane highway which for the greater part of the way is built directly over the canal, every bit of masonry in its path being knocked down into the roadbed. There is some question about how constructive man really is; there can be none about his destructiveness.

Nostalgia for the past, one of the characteristics of a careless rather than a carefree people, is not the problem here. Canals were built for economic reasons in Pennsylvania; they had a vigorous and short life; their functions were carried on under great difficulties; and they were rapidly taken over by the railroads — an outcome unanticipated when the canals were being built. Yet these long avenues of water can carry you or your goods inexpensively in any day or age if you are not in a hurry and it is difficult to believe that even now 100 percent of us are in a hurry. Canals are waterways, and waterways, natural or artificial, are perhaps the most engaging and enhancing aspect of any landscape, making a city of enchantment of Venice and a series of picturesque prospects of the realistic daily activity of Holland. There is little reason why at least a part of the state-owned Pennsylvania Main Line Canal should not have been maintained in operation to this day, for supplementary commercial as well as for recreational uses, serving to knit the state's rugged distances gently together, to keep communities from the ugly isolation that is now standard, and to add that perfectly real charm to natural landscape which controlled water never fails to provide, whether in millrace, dam-reservoir, canal, cultivated riverside, or duck-pond.

Pennsylvania's canals cost residents of the state millions. Yet railroad promoters, oblivious to public values and long-range interests of contemporary and future citizens of the state, destroyed these waterways for their own purposes without a qualm and as rapidly as they could contrive. Apologists for the railroads put up a bold front on the basis of a few selected facts, facts not in dispute. Somehow or other, even the historians of the canals write as if convinced that the canal system was, economically, a misadventure and that state ownership was a mistake.

At any rate, the canals are all but gone. There is a large and disorganized literature and tradition on the subject, and this book is an attempt to organize that material, chiefly with respect to the Main Line of state-owned canals and railroads, in a manner that so far as possible clears the factual record and preserves the significant detail. The authorities have been extensively used, checked one against another and, in disputed points wherever possible, by observation and by conversation with old canallers. The writers have been concerned primarily with untangling and presenting the record for what it may be worth; an opinion or two has been added for good measure.

CHAPTER I

EARLY WATERWAYS

It is no accident that the twenty largest cities in the United States are all coastal or river ports. The availability of water transport was an important consideration when the original sites for these cities were chosen and has had much to do with their subsequent commercial prosperity and population growth. Airliners, trains, and motor trucks, important as they are in the field of modern transportation, have not displaced ships and river barges as the most economical movers of heavy, bulky, low-value freight. The inland town with no waterway to the sea has always been greatly handicapped in competing industrially and commercially with her more fortunately placed neighbors.

Throughout the world, and down through history, the story has been the same: the greatest cities, with few notable exceptions, have been located alongside navigable bodies of water. Even in prehistoric times, the accumulated findings of archeologists show us, when men began to gather into relatively permanent communities they usually settled along streams, lakes or oceans. The remnants of primitive tribes surviving today in central African and upper Amazonian regions continue to show a disposition to keep their villages close to the larger rivers for the food and mobility they provide.

The aborigines of North America once had the same fondness for water-side homes. Explorers who first ventured into the upper reaches of Delaware and Chesapeake bays encountered tribes of

Indians living along the shores who traveled freely about in canoes made from birch and elm bark and from the trunks of huge pines. Some of these vessels were barely large enough to support the weight of one man; others carried burdens of a ton or more.

Fur dealers, following the example of the natives, used canoes to take their goods upstream to trading posts and to bring downstream the loot of precious pelts. Soon these same rivers and streams were to become the favorite highways of the early colonists.

William Penn demonstrated his acute awareness of the advantages of water transportation when, on September 30, 1681, he delivered detailed instructions to a commission he was sending to America to take possession of land recently granted to him by Charles the Second. The agents were told to lay out a new "green country town" at a point along the Delaware River "where it is most navigable, high, dry and healthy; that is where most ships can ride, of deepest draught of water, if possible to load or unload at the key side without boating or lightening of it." The site chosen by Penn's representatives for the settlement, so hopefully called Philadelphia, had the advantage of a well-sheltered ocean harbor. Just as important to the future prosperity of the town, it was located on a neck of land between the Delaware and Schuylkill rivers where there was easy access by water to the rich valleys through which those streams flowed.

While his proprietary capital was being established in Pennsylvania, Penn travelled through England, Wales and the Palatinate states to recruit colonists. His promises of religious freedom and generous portions of land encouraged many families to emigrate, 23 shiploads of prospective settlers coming up the Delaware River in 1681-82. In another two years the population of Penn's colony had reached 7,000 men, women and children, about two-thirds of whom had found homes outside of Philadelphia.

The new colonists could not wait for roads to be opened, but pushed their way upstream in canoes and light boats. Farms were cleared high on the Delaware and Schuylkill in places not to be marked by the ruts of wagon wheels for at least another generation. Land near the streams was always considered the most desirable, for crops could then be more easily floated down to the Philadelphia market. Ground along the smaller tributaries was taken up in preference to acreage nearer the city but remote from water. Such creeks might be shallow and impassable for boats most of the year but there were always a few days or weeks in the spring during which a raft loaded with produce could be floated out on the crest of a flood. When the farmer-boatman reached Philadelphia he usually sold his vessel as well as its contents, for it was easier to build another crude boat or raft for the next trip than to work the old one back upstream against the current. With welcome cash in his pocket, and a few necessities strapped to his back, he returned on foot to his frontier home, perhaps by a convenient Indian trail.

By the time the more desireable land in the Delaware and Schuylkill valleys had been claimed, new immigrants were finding their way westward into the valley of the Susquehanna, where an even greater area awaited exploitation.

Settlements spread rapidly northward along the Susquehanna and it quickly became known as the busiest boating river in the colony. But it also became evident that a significant part of the produce of this newly developed area was finding its way to Maryland's port of Baltimore on Chesapeake Bay; the natural waterway was determining the flow of trade in defiance of political considerations. Philadelphians drew off as much of this traffic as they could through the river markets at Harris' Ferry (now Harrisburg) and Middletown; they were materially helped by Conewago Falls, which made navigation of the Susquehanna very hazardous below the mouth of Swatara Creek. But for this rough place in the river, which the boatmen usually referred to as a riffle rather than a falls, much more of the river trade would have reached its market at Baltimore. Rivers were the important highways.

In time transportation of goods on the rivers came to be considered a skilled occupation, and farmers were less inclined to risk their own lives on the turbulent streams. Much freight was moved in the new Durham-boats, which were about 60 feet long, eight feet wide and two feet deep and, since they drew only 20 inches of water with a 15 ton load, were well adapted to use on shallow rivers. Unlike the cruder flat-boats, the Durham-boat was well built and could be poled or cordelled back upstream for another load, though little "pay load" could be carried against the current.

Unhindered right to navigate the rivers was not won without a struggle, for conflicts of interests developed early between the boatmen and those living along the streams. Local residents needed dams to obtain water-power for grist and saw mills. Further, when water was conveniently low, and at the cost of much hard work, fishermen built themselves weirs or fish-traps. A typical fish-trap consisted of stone walls converging across the river from opposite banks and pointing downstream in a funnel shape, with a net or "basket" fixed in a narrow center opening. It was generally placed below the mouth of a creek, where an island or shallow water aided in its construction, and where it was most detrimental to navigation. Ferry operators also were nuisances, with their low-hanging ropes, to haul their boats back and forth, strung across the rivers. All these obstructions had the effect either of limiting the boating season to a brief period during the height of spring floods, or of blocking passage of boats entirely.

Boatmen retaliated by knocking holes in mill-dams, destroying fish-traps, and slashing ferry lines wherever they found them in their path. In 1730 the colonial Assembly took action to protect the property rights of the millers and fishermen. The effect of this was to precipitate open violence bordering on civil war. In the end, however, the boaters succeeded in having the principle recognized that obstructions should not be placed in navigable streams. On March 9, 1771 ,the Assembly declared a number of rivers and creeks to be public highways, and that "all obstructions and impediments to the passage of his majesty's liege subjects up and down the same, erected or hereinafter erected, shall be deemed, held, and adjudged common nuisances".

What was perhaps the first public action to improve river navigation had been taken ten years earlier, in March 1761, when the Assembly authorized the appointment of commissioners to "clear and scour" the Schuylkill and make it navigable for boats, flats, rafts, canoes and other small vessels from the ridge of the Blue Mountains to the Delaware River. Much of the contemplated clearing and scouring consisted of removing man-made hazards, such as fish-traps, from the boating channel.

In 1769 a plea was made to the Assembly that the Juniata be made navigable so that goods might be carried down that river and the Susquehanna to Philadelphia. Two years later the

Assembly set up a commission "to expend any money that might be subscribed or appropriated for the improvement of the (Susquehanna) River or the Juniata, Conestoga, Bald Eagle, Mahanoy, Penn's Creek, the Swatara, Conodoquinet, and Kiskiminitas". This was spreading favors with diplomatic impartiality, but it was spreading them rather thin.

Philadelphia monopolized the commerce of the Delaware and Schuylkill and continued to enjoy a generous share of the Susquehanna trade for many years. A Reading newspaper noted on March 6, 1802, that in a single day boats had left there to go down the Schuylkill to Philadelphia with 1,201 barrels of flour, 1,425 bushels of wheat, 1,492 gallons of whiskey, 17 tons of bar iron, 365 pounds of butter and 500 pounds of snuff. The editor estimated that 160 first-rate teams of horses would have been needed to haul the same freight to market in wagons. One hundred and fifty thousand bushels of wheat were taken down the Susquehanna to Middletown in 1790; fifteen years later this volume was doubled. Large quantities of timber were floated down; Marietta, York Haven, and Columbia had numerous sawmills for processing rafted timber into marketable lumber.

In the spring of 1795, a man named Kryder, who had a grist-mill near Standing-Stone, brought the first boat down the Juniata the 95 miles from Huntingdon to Harrisburg with a cargo of 170 barrels of flour. The satisfaction of Philadelphians on hearing this auspicious news quickly turned to bitterness when they learned that this small ark had not made the customary stop at Middletown. It continued on down the Susquehanna, safely negotiated Conewago Falls and was in Havre de Grace with time enough in the evening of the second day for Mr. Kryder to load his flour aboard a shallop, which delivered it at Baltimore the next day at 12 noon.

Niles Weekly Register reported from Baltimore, on July 9, 1814, that 20,000 barrels of salt had been brought down the Susquehanna from New York salt-works. Three years later the same publication noted that in the first twelve days of April, $100,000 worth of property was sent to markets along the way from the village of Owego, New York. "It consisted largely of boats laden with plaster of Paris, and rafts of timber and board." Even New York state was contributing to the thriving river-business of Pennsylvania, but also, unfortunately, to commerce at the port of Baltimore. The *Register* reported later in the same summer that 94,500 bushels of wheat, and 83,200 barrels of iron had been carried down to tidewater Maryland between March 29, and July 1, 1817.

According to information given to the Pennsylvania Senate, "a respectable citizen of Harrisburg" saw 1,631 rafts and 1,370 arks passing that place between February 28, and June 23, 1827. He estimated that the rafts contained about 40,775,000 feet of lumber, and added that "two hundred of the arks were laden with anthracite coal, averaging 35 tons each, making 11,000 tons. The remaining arks were laden principally with flour and whiskey for the Baltimore market and carried on an average 400 barrels each, making 468,000 barrels." The same observer "supposed" that about 300 keel boats went down the river in the same period, loaded with approximately 240,000 bushels of wheat. The Harrisburg waterfront must have been a lively spot for the sidewalk-superintendent of those days.

Out in western Pennsylvania, almost completely isolated from Philadelphia by intervening mountain ranges, the frontier town of Pittsburgh was developing into the business center for its own system of waterways. For many years boat building was to be its major industry. As early as 1768 a few daring settlers with their families and household goods were passing through Pittsburgh on their way down the Ohio. The small canoes of the Indians and fur traders did not meet the needs of these emigrants. At first simple rafts were built; then with small, gradual improvements for protection from the weather, the raft became the flat-boat, "the boat that never came back". Once the flat-boat reached its destination it could be dismantled to provide the owner with materials for a new home. A flat-boat was often large enough to accomodate a family in its forward part, with room in the rest of the hull for cattle and a few farm tools. The sides were built high, and sometimes loopholed, because of the constant fear of Indian attack. These crude boats were steered by a long oar at the stern, occasionally supplemented by a shorter oar at the bow. On the voyage down the Ohio, usually begun in late fall or early spring, current furnished the motive power, the sweeps along the side being manned only sporadically. After the land was settled a larger version of the flat-boat served to carry farm surpluses to market.

Boat building boomed in Pittsburgh, as well as in other favorable spots along the Monongahela, including Elizabethtown (now Elizabeth) and Brownsville. By 1788, yards were busy turning out boats in towns up the Youghiogheny such as Connellsville and Robbstown (later West Newton). Connellsville was selected by its founder Connell as the site for a town, "because it was here that emigrants and travelers to the West, of whom there were already great numbers in transit, coming over the road from Bedford by way of Turkey Foot, reached a boatable point on the Youghiogheny river".

A more carefully made craft, called a keel-boat because of the long heavy piece of timber used in the center of the frame, came into use about 1790. It was similar in design to the eastern Durham-boat and was easily adapted later for use on the canals. The keel-boat often carried an auxiliary sail, but was usually rowed, poled from the sides, or cordelled along the bank when the crew was fighting back up the river after the relatively easy trip down-stream.

Pittsburgh, at the junction of the Allegheny and Monongahela, was in an ideal position to benefit from the varied products that were being floated in increasing quantities down these streams. Most important, of course, was farm produce; but for a time nearly all of the salt used in western Pennsylvania and the Ohio country was brought from the New York Canandaigua salt works by way of Erie, French Creek, and Allegheny River. At the end of this long haul salt sold for ten to twenty dollars a barrel. The merchants of Pittsburgh, in turn, used keel-boats and smaller craft to send flour, meat, whiskey and other articles of trade into up-river settlements. The sparsely inhabited Great Lakes region received most of its imports from Pittsburgh, the favored route being up the Allegheny to Franklin, by French Creek to Waterford, to Erie by wagon, and from there in sailing ships to all parts of the lakes.

Large quantities of timber and sawed lumber were rafted down the Allegheny each year in the short interval between the clearing out of the ice and the beginning of the dry summer months when low-water made the boulder-strewn glacial channel too dangerous for navigation. Daniel Jackson of Warren ran a raft of 30,000 feet of pine boards to Pittsburgh in 1799, the earliest known instance of lumber being floated down the Allegheny. In 1812, seven million feet of lumber were inspected in Pittsburgh, and by 1831 an estimated 30,000,000 feet of lumber was coming down the river annually.

In March 1830, the *Erie Gazette* reported that about 100 flat-bottomed boats were heading down French Creek for Pittsburgh from the region between Waterford and Bemus' Mill. These boats had been built mostly by farmers to freight their hay, oats, potatoes, and other local products, salt, staves, bark, shingles, and cherry and walnut lumber, to the Pittsburgh market. The *Gazette* calculated that the lower section of the creek, below Bemus' Mill, would add an additional hundred boats similarly laden to the fleet, so that some 200 boats plus an uncounted number of rafts were riding out of French Creek on that year's freshet. Total burden of the fleet amounted at best to no more than five or six thousand tons, yet without natural waterways there would have been no means for the settlers to send such bulk products to market: existing wagon roads were useless or inadequate for heavy hauling.

The first steamer to appear on a western river was Robert Fulton's *New Orleans,* built at Pittsburgh in 1811 under the direction of Nicholas Roosevelt. The *New Orleans* created a sensation on her trip down the Ohio and Mississippi, but proved too feeble to return upstream and spent the rest of her short life plying the slackwater between New Orleans and Natchez. The next four or five steamers, all built in the Pittsburgh area, had such heavy engines and their hulls rode so far down in the water that they could be navigated only when the rivers were high, though the currents were then at their swiftest.

Captain Henry Shreve of Brownsville is credited with having developed the first really successful river steamboat, the *Washington,* a shallow-draft, light-engined boat that served as the prototype for all river boats built in the next hundred years. When he brought the *Washington* back to Louisville from New Orleans in 1817, skeptics conceded that the river currents had been conquered. Captain Shreve also was successful in a single-handed court fight to break the Fulton monopoly, thus opening the western rivers to free development of steamboat navigation.

Pittsburgh took an early lead in steamboat building. By 1835, of 684 steamers on the rivers, 304 were made in Pittsburgh, 221 in Cincinnati, 103 in Louisville, and the remaining 56 in a scattering of other places. Pittsburgh also became the center of steam engine manufacture, making many of the power plants that were installed in boats built elsewhere on the rivers.

The steamboat did not prove to be an unmixed blessing to Pittsburgh merchants. So long as the river was a one-way traffic artery, most goods sold in towns along the river were drayed over the mountains from the east and re-shipped down the Ohio. After steamboat operators demonstrated that they could provide dependable up-river service it was apparent that merchandise could be brought around the coast to New Orleans and up the Mississippi at a fraction of the former cost. Freight was delivered at the wharf of Cincinnati from Philadelphia, *via* New Orleans, for as little as one cent per pound. Immigrants still made port at Philadelphia or Baltimore and traveled overland to Pittsburgh where steamboat passage could be found for the West, but an increasing number avoided the arduous mountain trip by sailing directly to New Orleans where steamers gave them ready access to the interior of the country. It was gradually becoming clear that Pittsburgh was not the only "Gateway to the West".

On July 4, 1817, New York State formally began construction of the Erie Canal, designed to connect the Hudson River near Albany with Buffalo and Lake Erie. This was the greatest engineering scheme so far attempted anywhere in the United States and many people considered the whole idea to be nothing but a wild dream.

Pennsylvanians differed among themselves on the extent to which the Erie Canal, if completed, might divert business from their turnpike route. The Great Lakes region had as yet few settlers and the total volume of goods shipped into the area by way of Pittsburgh was not large. On one score business leaders of Pennsylvania were chagrined, for they had expected, sooner or later, to open their own waterway to Lake Erie by way of the Allegheny River and French Creek. New York had stolen the jump on them.

CHAPTER II

THE DEVELOPMENT OF CANALS

Even in the colonial period the possibility of uniting rivers of eastern and western Pennsylvania to form an integrated system of waterways excited men's imaginations. As early as 1762, the merchants of Philadelphia requested that a board be appointed by the provincial Assembly to explore the west branch of the Susquehanna River with a view to connecting that stream with a tributary of the Ohio. This was at a time when the only line of communication to Pittsburgh and the Ohio country was by way of Forbes' Road, then little more than a bridle path. Resources were not available for such an ambitious undertaking and, for that matter, it was some years before the courses of the rivers and creeks were explored thoroughly enough to establish with any certainty which of many possible routes might be most feasible for a canal.

The more immediate problem of building an artificial waterway between the Susquehanna and Schuylkill rivers was examined by the American Philosophical Society of Philadelphia, and in 1771, following a field survey led by David Rittenhouse, the Society called for the construction of a canal to join the two rivers by way of Swatara and Lebanon valleys. In 1791, a committee of the state legislature made an official report favoring development of a system of canals and river improvements from Philadelphia to Lake Erie, by way of the Susquehanna River. Even yet the time was not ripe for such an enterprise, but continuous agitation by the more vociferous canal advocates kept the dream alive.

Some progress was being made. While Pennsylvania, in 1791, was unready to launch its own canal building program, it gave its legislative blessing to incorporation of the Schuylkill and Susquehanna Navigation Company, formed for the purpose of "opening a canal and lock navigation" between the Schuylkill and Susquehanna rivers, along the courses of Swatara and Tulpehocken creeks. On the 10th of the following April, another group of investors, known as the Delaware and Schuylkill Navigation Company, was authorized to open a canal from the Delaware River at Philadelphia to the Schuylkill at Norristown. This group started its canal at the corner of Broad and Vine streets and got as far as the bridge on Columbia Avenue; then it ran out of money. In 1795 the legislature authorized the two companies to raise jointly the sum of $400,000 by a lottery. This exclusive lottery franchise, on being farmed out, produced handsome returns for the operators but only meager funds for the projected canal.

In 1806, the state again came to the aid of the Schuylkill and Susquehanna Navigation Company by purchasing 400 shares of its stock. But work languished and came to a stop with only 15 miles of canal completed. Then, in 1811, the two canal companies were combined to form the Union Canal Company of Pennsylvania. The new company was confirmed in its right to extend its line from Philadelphia to Lake Erie, or to any other place in the state that occurred to its directors, though it was intended that the company concentrate its energies on getting some sort of a line open between Reading on the Schuylkill and Portsmouth, now part of Middletown, on the Susquehanna. Work was resumed with a certain amount of vigor in 1821 and by 1828 the 78-mile canal was in operation.

The Union Canal, 36 feet wide at surface level and 24 feet at bottom, with a four-foot depth, was designed originally for boats of from 25 to 30 tons burden. The 93 lift-locks, to overcome 519 feet of lockage, were 75 feet long and eight-and-one-half feet wide. Part of the route was through a limestone district where it was found necessary to plank an extended length of channel to keep the water from escaping. Two large steam pumps were hauled by wagon all the way from Pittsburgh and used in raising water to fill summit levels of the canal when it was found that an adequate supply could not be delivered to those levels by gravity alone.

Another canal, however, the Conewago, one and a quarter miles long, was the first canal to be put into operation in Pennsylvania, and one of the earliest in the United States. Authorized by the legislature in 1793, it was completed four years later to provide safe passage for Susquehanna river-craft around Conewago Falls. This canal made it possible for boats to drift down past Middletown to Columbia, thereby shortening the overland haul to Philadelphia; but it also removed the greatest obstacle on the route to Baltimore. The *Lancaster Journal* reported on May 23, 1801, that "within the last fortnight not less than 75 arks have arrived at tidewater from up the Susquehanna, well loaded with flour, wheat, bar-iron, and such, worth not les than $150,000." In the following year 248 boats carrying grain passed through the Conewago Canal and the volume of traffic continued to increase year after year.

Philadelphians hoped to recapture part of this Susquehanna trade for their market when, in 1801, a company was formed to open a ship canal between Chesapeake Bay and the Delaware River estuary. Though the proposed waterway was entirely outside of Pennsylvania its construction was strongly urged by residents of the state. A series of financial difficulties interrupted construction, but after a fresh start in 1824, the canal was pushed to completion by October 17, 1829. It was intended to accommodate "vessels drawing eight feet of water, of twenty-one feet in breadth, and ninety-eight feet in length including bowsprit".

A number of smaller canal enterprises were started in the early part of the 19th century, all calculated to fill local transportation needs but destined to meet with varying financial success. In 1803 a charter was granted to the Conococheague Navigation Company for the purpose of providing Chambersburg with a better outlet to the Potomac; and in 1806 the Conestoga Lock and Dam Navigation Company was chartered to improve Conestoga Creek for 18 miles between Lancaster and its junction with the Susquehanna River near Columbia.

Two of the most successful private canals in the state were built, one by the Schuylkill Canal Navigation Company and the other by the Lehigh Navigation Company. The first of these firms, chartered in 1815, constructed a canal along the Schuylkill river from Philadelphia to Mount Carbon, below Pottsville. It is sometimes said that the Schuylkill Canal was opened in 1822 but there was no through traffic until sometime in 1825. A later extension took the waterway in 1828 through Pottsville to Port Carbon, more than 108 miles up in the anthracite fields. This line also made a connection with the Union Canal at Reading, to complete Philadelphia's link with the Susquehanna. Locks on the canal were 75 feet long, 8 feet wide, and 3 feet deep. Boats were of 18 to 23 tons capacity.

The Schuylkill Canal, like the Lehigh, remained an important coal route for many years. It had been an immediate success, mainly because of the rapid expansion of the anthracite market. The company was already paying dividends in 1829; by 1839 they were 19%. Between 1833 and 1835 the channel was enlarged to accomodate boats up to 13 feet wide with a 60 ton capacity; channel depth was increased to 4 feet and a double line of locks built, side by side, to allow up and down stream boats to move simultaneously. In 1842 the Philadelphia and Reading Railroad was opened and in 1845-46 the Schuylkill Canal was again enlarged to meet this competition. The channel was deepened to 5½ feet, the number of locks decreased from 109 to 72, and the locks themselves enlarged to accommodate boats 100 feet long and 17½ feet wide, with a 180 to 200 ton capacity.

Following this enlargement, tonnage increased rapidly and reached a peak in 1859 of 1,699,101 tons, mostly coal. There were some 1400 boats on the canal. Nearly half the coal was sent on to New York by way of the Delaware and Raritan Canal. The Schuylkill Canal Navigation Company itself operated a number of short railroads to bring coal to the boats from the mines. Because of repeated disastrous floods, however, actual earnings were never as great as before this final enlargement.

The Lehigh Navigation Company was organized in 1818 under an "Act to improve the navigation of the river Lehigh". This was largely the project of two Philadelphia Quakers, Josiah White and Erskine Hazard, who early recognized the possibility of exploiting the Lehigh Valley, rich in anthracite. Work was begun at once. A channel 20 feet wide and 18 inches deep in the Lehigh River was cleared so that small boats carrying 100 barrels, or ten tons, could be floated down from the town of Stoddartsville to Easton on the Delaware, a distance of 84½ miles. These boats, crudely built arks, coupled in pairs and steered with a long oar, continued down the Delaware River to Philadelphia, where their cargoes of coal were unloaded and their hulls broken up to be sold for lumber. Because of the rapid fall in the river, sufficient water depth to maintain navigation was available for only a few months in spring. To lengthen the boating season, Josiah White built thirteen dams in the 46¾ miles between Mauch Chunk (renamed Jim Thorpe, Pa., on Sept. 1, 1954) and Easton. Instead of having conventional locks with double gates, these dams were equipped with White's patented "bear-trap" locks, each with a single flash gate raised or lowered by hydraulic pressure. When opened, the gates allowed loaded boats to pass through a wooden chute with a rush of water that served to carry them on to the next slackwater pool.

A small amount of anthracite, 365 tons, reached Philadelphia in 1820. It was offered at $8.50 a ton, delivered, but its utility was still unproven and more than half of the shipment remained unsold on the wharf. That year White and Hazard consolidated their navigation and coal interests to form the Lehigh Navigation and Coal Company. Two years later, on Feb. 13, 1822, they incorporated as the Lehigh Coal and Navigation Company, the name under which the company is still operating. Nine thousand tons of the new "stone coal" were delivered—and sold—that year. Under the terms of the orginial charter, two-way transportation was to be provided by 1838. This was accomplished ahead of time when, in 1829, a separate canal, using only a few miles of slackwater pools, was completed from Easton to Mauch Chunk. By 1837 the canal had been extended another 25 miles to White Haven in the upper Lehigh Valley coal fields. A number of feeder rail lines were used to bring coal from the mines to the canal.

In time, and before railroads were available and adequate to handle the tremendous traffic, the Lehigh Canal, with its Delaware Division extension, served to transport millions of tons of anthracite coal to the Philadelphia market. As other coal producing regions began to compete for the Philadelphia outlet with shipments by way of the Schuylkill and Susquehanna canals, the Lehigh people turned their attention to relatively undeveloped markets in New York and New England. For a time Josiah White hoped that this traffic could be routed to market by way of the Morris and the Delaware and Raritan canals. Neither of these routes lived up to expectation since they could not carry the great tonnage that came their way. The Central Railroad of New Jersey eventually provided a more dependable link between Easton and New York, and the Lehigh company developed some of its own rail properties to open all-rail routes to New England. The importance of the Lehigh Canal in this transportation network, however, diminished rapidly as soon as a rail line was opened along the Lehigh River from Easton to Mauch Chunk.

The Delaware and Hudson Canal Company was incorporated in New York on April 23, 1823, and the same year it obtained the right to extend its line into Pennsylvania. The New York terminus of this canal was at Eddyville, New York, where it locked into Rondout Creek, a mile or two above the point where the creek entered the Hudson. The company's office was in Rondout, at one side of the creek mouth, opposite Kingston. From Rondout, this canal followed Rondout Creek and crossed an intervening ridge to Neversink River, which it followed to its junction with the Delaware. From this point it went upstream along the Delaware to Port Jervis at the mouth of Lackawaxen Creek, up which it went to Honesdale. It was at Honesdale that coal was delivered by gravity railroad from mines at Carbondale.

Since railroads in time displaced canals as the basic means of transportation the earliest proponents of railroads are apt to be credited with having had wisdom and vision superior to those contemporaries who favored canals. More realistically, the topography of the land usually determined whether people in a given locality advocated canal or railroad. Those living along rivers and streams wanted canals; in hilly regions where construction of canals was obviously impracticable, people wanted railroads. It was almost as simple as that.

One of the first railroads of any consequence in Pennsylvania was the nine-mile Mauch Chunk line, opened in the summer of 1827. It was strictly a coal road, cars being drifted down by gravity from the anthracite mines on Mauch Chunk Mountain to the village of Mauch Chunk, where their loads were dumped into boats on the Lehigh River. Mules hauled the empties back up the slope and then rode down in a special mule car. Rails were improvised from timbers about 20 feet in length and four by five inches in the cross section. The rails were "shod" on the upper and inner edges with flat bars of iron, about two inches wide and half an inch thick. The manager of the Mauch Chunk line calculated that hauling cost four and one-half times as much a ton-mile by rail as by canal.

The year after the Mauch Chunk line was opened the Delaware and Hudson Canal Company completed a similar gravity road between its mines at Carbondale and the head of canal navigation at Honesdale. Stationary engines were used to drag loaded cars up five inclined planes along the route, but their own weight took them down most of the 16-mile trip. Empties were returned to the mines by horses and mules. During the second year of the line's operation four English-built locomotives were delivered, including one from the plant of the famous George Stephenson. The well-known Stourbridge "Lion" made several runs over the road but it was found that the rails were not sturdy enough to carry the weight of heavy engines.

Cooper's "Tom Thumb" made several trips in 1830 over the first section of track completed on the Baltimore and Ohio Railroad, probably the first locomotive to operate on a "public" railroad. But it was out-raced and out-pulled by a horse, so most people were unimpressed. The same year in England Stephenson delivered eight engines which were to give satisfactory service on the Liverpool and Manchester line, but it was another five years before America saw the first mobile engine that could outperform a team of good horses. Even yet, however, canals continued to offer the most economical transportation and railroads were considered as most suitable in their use as canal "feeders".

During the early years of westward expansion everyone was demanding better transportation, whether canal or railroad, but the enthusiasm of investors had been dampened by long delays in getting the Union Canal into operation and by the dismal collapse of effors to finish the Schuylkill and Delaware Canal. When construction of the Erie Canal was begun in 1817, and it became evident that the state of New York was actually going ahead with its scheme to connect the Hudson with Lake Erie, newspapers and civic leaders of Pennsylvania started a feverish agitation for a state-owned waterway between the Ohio River and the Altantic seaboard. Pittsburghers took the lead in this movement and addressed scores of appeals to Philadelphians urging them to support a state canal system. It was pointed out that Philadelphia would suffer a great loss of business with the opening of the New York canal and its cheap freight rates.

Cautious Philadelphia Quakers were not easily roused to action, especially since it was obvious that they would be obliged to find most of the needed money. Investment capital was scarce in those years, for the United States financially was still in colonial status. Pennsylvania taxpayers shuddered at any suggestion that funds for building a canal might be raised in part on a pay-as-you-go basis, as in New York. The popular attitude was: "Let's get the canal built now and worry about paying for it later".

The Pittsburgh *Gazette* probably reflected the opinion of many of its readers, and their generally contemptuous lack of concern for other people's money, when it declared, on January 22, 1819, that "If the canal can be opened by a fictitious capital a boat will float upon it as safely as if it were finished by treasury notes of the United States, although bearing an interest of 5 per cent. Let individual bankruptcy occur, the property will only change masters, and these great establishments will be as important and as lucrative when bought at sheriff's sale as when in the hands of the original proprietors although they have cost millions in the construction." Talk like that must have given Philadelphia bankers a mighty queasy feeling.

Impatient of delay, and fuming at Philadelphia's seeming complacency, Pittsburghers begun to wonder if, after all, a canal direct to Chesapeake Bay might not be more easily obtained and prove just as advantageous to their interests. Certainly it was no fault of theirs that another seven years elapsed before a start was made on construction of the Pennsylvania Canal.

In the end, however, it was Philadelphian initiative that got canal legislation adopted, though not until the Erie Canal had become a reality. The Pennsylvania Society for the Promotion of Internal Improvements in the Commonwealth (more commonly called the Pennsylvania Improvement Society) of Philadelphia, had much to do with putting the canal program across. It sent William Strickland and his assistant, Samuel Honeywell Kneass, to Europe as its agents to study the canals of England, Wales, and Scotland, to pick up all the practical information they could, and to make working drawings. During these later days of canal promotion, leading Philadelphia figures were Nicholas Biddle, Justice Tilghman, and Mathew Carey; and in the legislature another Philadelphian, Dr. William Lehman, was chairman of the Inland Navigation and Internal Improvement Committee.

A number of delegates from Pennsylvania attended a canal convention in Washington on November 6, 1823, hopeful perhaps that Federal aid would overcome financial difficulties standing in the way of a canal-building program for their state. Congress did not respond by loosening the national purse strings and it subsequently became more evident that if Pennsylvania was ever to have a Main Line canal Pennsylvania would have to build it.

On March 27, 1824 a three-man commission was set up by act of legislature to explore proposed canal routes between the Susquehanna and Allegheny rivers. The surveyors concentrated most of their efforts on finding some means to connect the sources of the Juniata and Conemaugh since these rivers seemed to offer the most logical route for a canal and the limited time available did not permit a more complete examination of every possible alternate plan.

In their report to the legislature on February 2, 1825, commissioners James Clarke and Jacob Holgate declared that the route they had surveyed up the Juniata was "perfectly practicable" and strongly recommended its adoption. Residents along the west branch of the Susquehanna were keenly disappointed on hearing this report for they had confidently anticipated having the canal built through their region. Their hopes revived a short time later when the third commissioner, Charles Trcziyulny, made a minority report in which he expressed doubt as to the practicability of the Juniata route and attacked, among other things, the proposed four-and-a-half-mile tunnel through the Allegheny Mountain that would be necessary to link the waters of the Juniata with those of the Conemaugh. Protests also were heard from citizens in other parts of the state who resented being cut off from the expected benefits of the new transportation scheme. The log rolling that followed resulted in a new law, on April 11, 1825, that ordered the examination of seven routes, the one at the top of the list and presumably the one meant to receive the most careful consideration being "from Philadelphia through Chester and Lancaster counties and thence by the West Branch of the Susquehanna, and the waters thereof to the Allegheny."

At a convention in Harrisburg on August 4, 1825, delegates from 46 counties discussed the timely subject of "Public Improvements." They resolved that "the improvemnt of the Commonwealth would be best promoted, and the foundations of her prosperity and happiness most securely established, by opening an entire and complete communication from the Susquehanna to the Allegheny, and Ohio, and from the Allegheny to Lake Erie by the nearest and most practicable route, and that such a work is indispensably necessary to maintain the character and standing of the State and to preserve her strength and resources!" Publicity given this meeting did much to prepare voters and members of the legislature for positive action on a state canal program.

While Pennsylvania was facing up to this phase of its "struggle for economic supremacy", the Erie Canal was completed on November 4, 1825. New Yorkers celebrated, and Pennsylvanians groaned. The ominous predictions of Pittsburghers were soon exceeded by distastrous events. Philadelphia, already hard hit by the competition of Baltimore and the National Road, saw much of its remaining commerce drawn to New York City and the new canal. Trade with Pittsburgh and the western country dwindled toward the vanishing point. Many of Philadelphia's largest financial institutions went into bankruptcy. Pennsylvanians had actually resigned themselves to some loss of business but the enormous success of the Erie Canal came as an unanticipated and unpleasant shock. In 1795, Philadelphia's exports were said to have been 40% greater than those of New York City; by 1825 they were 45% less. To make matters worse, on July 4, 1825, Ohio began construction of a canal to connect Lake Erie at Cleveland with Portsmouth on the Ohio River. This Ohio and Erie Canal, in conjuction with New York's Erie Canal, promised to provide an all-water route from the Altantic seaboard to every point on the western rivers. Naturally Pennsylvanians were outraged at such a prospect.

CHAPTER III

THE CANAL BOOM

The 1826 session of the legislature met in an atmosphere of excitement and lost little time in debate. A bill for the construction of the "Pennsylvania Canal" was rammed through the lower house on January 16th, three weeks before the canal commissioners could complete the report on their various surveys. As finally approved, the Act of February 26th committed the legislators to a system of internal improvements aimed at providing an uninterrupted waterway from Philadelphia to Pittsburgh and Lake Erie. It was a program based on determined optimism rather than on scientific knowledge and careful planning. For example, construction was begun on a section at each end of the proposed canal before the problem of the middle was faced; before, in fact, a decision had been reached as to which of the possible routes should be followed in the attempt to pass over, around, or through the mountains, or whether a practicable route for a canal really existed.

Pennsylvania's canal building program was undertaken not only without a plan, but with borrowed money, on the blithe assumption that when the waterway was completed revenue from tolls would pay off the debt. Indeed, there were ardent propagandists who professed to believe that canal profits would eliminate all need for taxation. The expenses of government and a free education for every child in the state would be met by the canal tolls. A few kill-sports soberly insisted that the whole business was impracticable, that "it would require an enormous and oppressive taxation, to which our citizens would not submit, that independent of these reasons, it would, if accomplished, be confined to certain parts of the State, while large and important sections would be debarred from them, whereas the burdens would be borne by the whole." Such opposition was mostly sectional, however, coming from the representatives of counties like Bedford, Cumberland, and York, whose established turnpike trade was threatened by the proposed canal.

Pointing to the success of the Erie Canal, Pennsylvanians assured each other that their line was bound to be even more prosperous because of the favorable difference in latitude and climate. The boating season on the Pennsylvania Canal should be much longer than that of the northern route, where ice stopped all traffic for three months or more each year.

Though the Erie Canal was taken as the model for the Pennsylvania route, New York's example was not followed in one important respect. To aid in financing construction of the Erie a tax was placed on land along the right of way, land that was certain to increase in value with completion of the waterway. Also, special taxes, such as the salt excise, were pledged by New York as a guarantee of interest payments on canal bonds. Pennsylvania made no effort to pay any part of the cost of internal improvements out of current revenue.

The Pennsylvania Main Line was started with the cautious appropriation of $300,000. It was believed that the sections of canal authorized for immediate construction were so situated that they would prove useful no matter which path might be adopted for the intervening route, and even if no further extensions were ever made. The eastern section along the Susquehanna, from the mouth of the Swatara near Middletown to the mouth of the Juniata at Duncan's Island, a distance of 24 miles, would open canal traffic between Philadelphia and Harrisburg by way of the soon-to-be-completed Schuylkill and Union canals; while the western section, running north along the Allegheny River for 30 miles between Pittsburgh and the mouth of the Kiskiminetas, would provide transportation in that end of the state. A navigable feeder from French Creek to the summit level of Conneaut Lake was also authorized, to be constructed as soon as it was deemed "expedient and practicable", but the Board of Canal Commissioners concentrated its efforts on the two Main

Line sections. How and where the ends of these isolated segments were to be joined continued to be the subject of much hot debate.

If the legislators were in doubt as to the political wisdom of their decision to embark on a canal program they must have been quickly reassured when they returned to their constituencies. The canal craze was sweeping the country and the only regret voiced by voters was that a much greater program had not been undertaken. It was evident that candidates for public office would be elected or defeated on the basis of their stand on canal issues. The more nimble politicians climbed on the bandwagon and henceforth no local transportation project was too impractical or fantastic to claim their fervent support.

The impact made on the minds of Pennsylvanians by the completion of the Erie Canal was reflected in a suddenly aroused interest in every sort of private venture in the field of transportation. From the 1826 legislature no less than eight companies asked for and received state charters authorizing the building of canals or the improvement of natural waterways. These projects ranged from scouring a few miles of creek bottom to construction of a major canal between a point on Chesapeake Bay and the Ohio River at Pittsburgh. Every Pennsylvanian who lived along a brook deep enough to float a duck was dreaming of the day when, with the help of a state appropriation, his brook would be navigable canal.

When the legislature convened the following year its members vied with each other for the honor of initiating canal legislation. The Act of April 9, 1827, when it was signed by Governor Shulze, provided for extending the eastern section of the canal up the Juniata River to Lewistown, 45 miles above Duncan's Island; while a branch was to be constructed north along the Susquehanna River from a junction at Duncan's Island to Northumberland, a distance of 39 miles. Further studies by the canal board were "to ascertain the practicability of an entire navigable communication between the west branch of the Susquehanna and the Allegheny River", as well as the location and cost of a canal from Northumberland up the north branch of the Susquehanna to the state line. Engineers were reporting in favor of the Juniata route for connecting the eastern and western sections of the Pennsylvania Canal, but local advocates of more northern passages never conceded any merit to such opinions.

The western end of the state was not neglected. The legislature authorized the commissioners to extend the western section of the canal, then under construction between Pittsburgh and the mouth of the Kiskiminetas, on up the Kiskiminetas and Conemaugh rivers an additional 44 miles "to a point at or near Blairsville". Surveys also were to be made of several possible canal routes between Pittsburgh and Lake Erie, one by way of Allegheny River and French Creek, and the other by way of Beaver and Shenango rivers and Conneaut Creek. Operations were to begin on a feeder from French Creek to the summit level of Conneaut Lake, with contracts to be let for as much of the work as might be adapted to either of the contemplated routes connecting the Pennsylvania Canal with Lake Erie.

The commissioners were ordered to examine the feasibility of a canal along the Delaware River from Easton, at the mouth of the Lehigh, to Philadelphia or Bristol, and if it appeared that such a canal should be constructed, to proceed to locate and contract for a portion of it. This was the route of the Delaware Division Canal which by 1832 provided an extension for movement of the anthracite coal boats from the Lehigh Canal to Bristol and the Philadelphia market. At the same time a survey and report was to be made on the practicability of a canal along the upper Delaware to Carpenter's Point, where a connection could be made with the Delaware and Hudson Canal into New York State.

It is doubtful if the legislature ever seriously considered constructing many of the projects it asked to have surveyed. For instance, surveys were directed to be made down Brandywine River to a point near the Delaware state line, then across the dividing ridge and along Chester Creek to the Delaware River, with a portage or railway across the ridge. The practicability of connecting the north branch of the Susquehanna with the Lehigh by means of a canal or railway was to be reviewed by the canal board. Estimates were demanded for a canal through the valleys of the Conedoguinet, Yellow Breeches, and Conococheaque creeks, with a view to connecting the Susquehanna and Potomac rivers. The old route of the defunct Schuylkill and Delaware Canal, through the district of Southwark, was to be re-examined and a report made on whether it would make a useful link in the line of the Pennsylvania Canal. None of these schemes ever got beyond the planning stage.

Surveys and estimates were ordered for a canal, and for a railway suitable for locomotives or stationary engines, from Philadelphia through Chester and Lancaster counties, to connect "by the nearest and most eligible route" with the other sections of the Pennsylvania Canal already under construction. In this instance the legislature really meant to go ahead with the project. For years the businessmen of Philadelphia had been casting covetous eyes on the growing volume of goods being floated in keel-boats and arks down the Susquehanna to the port of Baltimore. Many of them believed that a railroad connecting the Susquehanna and Schuylkill rivers would divert this profitable trade to Philadelphia where it belonged. There was little thought at first that such a road might become part of a greater transportation system reaching from the seaboard to the headwaters of the Ohio River.

Some four years before this time, on March 31, 1823, the legislature had granted a charter to the Pennsylvania Railroad Company (not related to the modern company of the same name) to build and operate a railroad between Columbia and Philadelphia. One of the projectors, John Stevens, made some preliminary surveys and estimates but investors were wary and the charter was allowed to lapse. On April 7, 1826, a new charter was granted for the Columbia, Lancaster and Philadelphia Railroad Company. Like its stillborn predecessor, this was intended to be a stock company; but when investors could not be found to support the undertaking, it was declared to be too much of a job for private capital. Members of the 1827 legislature, in a receptive mood for almost any scheme to improve transportation, included state construction of the Columbia and Philadelphia Railroad in its omnibus canal bill with scarcely a dissenting voice.

In 1827, the legislature, with much less caution than it had shown the preceding year, appropriated $1,000,000 for use of the canal board in constructing the authorized sections of the Main Line and its branches. Borrowing money was an easy matter. Banks used state bonds as the basis for printing more bank notes, and in a pinch, new banks could be chartered, with the state as an important stock-holder.

By the Act of March 24, 1828, the commissioners were directed to locate and contract for extensions to the Main Line of the canal as follows: "from its commencement at the mouth of the Swatara (Middletown) down the Susquehannah to Columbia in Lancaster County; from Lewistown to the highest point expedient and practicable on the Juniata;" and from Blairsville "to the highest point expedient and practicable for a canal on the Conemaugh." They were also "to locate a route for a rail road across the Allegheny mountain to connect the Juniata and Conemaugh sections of the Pennsylvania Canal, and to contract for the completion thereof," and "to locate a rail road from the city of Philadelphia through the city of Lancaster to Columbia on the Susquehannah, and from thence to the west end of the borough of York."

Thus, for the first time, in 1828, the final course of the Philadelphia-Pittsburgh Main Line was officially spelled out: a railroad from Philadelphia to Columbia; a canal from Columbia along the Susquehanna and Juniata rivers to Hollidaysburg, "the highest point practicable"; a railroad over the Allegheny summit to Johnstown in the valley of the Conemaugh; and a canal along the Conemaugh, Kiskiminetas and Allegheny rivers to Pittsburgh. Involved was a little more than 395 miles of canal and rail construction. The use of the Union and Schuylkill canals as eastern links of the state system was rejected in part because the Union Canal, with narrow 8½ foot locks, could not pass the larger boats of the Pennsylvania Canal, on which a minimum width of 15 feet was maintained. Not to be discounted, however, was the tremendous political leverage of towns like Lancaster, Columbia, and York, whose citizens were determined to share in the prosperity promised by the new trade route.

The legislature's instructions to build "a rail road across the Allegheny mountain to connect the Juniata and Conemaugh sections of the Pennsylvania Canal" reflected the latest information received from the engineers: that a continuous waterway could not be achieved, even with a four-and-a-half-mile tunnel through the mountains. The canal would have to be raised so high, to reach the proposed tunnel level, that an adequate supply of water to fill it could not be assured. Nor is it surprising that engineers were reluctant to take on the job of drilling a mountain hole more than four miles long with the crude boring methods then in use. Final decision on construction of a railroad for this troublesome section, however, was yet to be made.

The Susquehanna branch of the Main Line, authorized the year before between Duncan's Island and Northumberland, was to be extended both up the west branch of the Susquehanna to Bald Eagle Creek, and up the north branch to the New York line. As evidence that dreamers and realists were working hand in hand on legislation it is noteworthy that, though the canal was "authorized" to the New York line, it was more exactly stipulated that "not more than 45 nor less than 15 miles" of this work was to be contracted for; and "not more than 25 nor less than 20 miles" of work was to be let on the west branch route toward Bald Eagle Creek. To keep hope alive in Delaware Valley, the legislature ordered the commissioners to contruct a canal from Taylor's Ferry to Easton, and "to locate but not contract for a canal from Easton to Carpenter's Point, where a junction may be made with the Delaware and Hudson Canal".

Beyond the actual authorizations mentioned, the legislature ordered a number of surveys, some perhaps with the honest intention of preparing for future construction, but others quite probably as sops to the voters in areas of the state not likely to benefit directly from the internal improvements already under way. The commissioners were "to survey the valley of the Monongahela (again) from Pittsburgh to the Virginia state line; the valley of the Susquehannah from Columbia to the mouth of the Conestoga river with a view to improve the navigable communication; to make surveys . . . from Huntingdon through Woodcock and Bedford; and by the headwaters of the Allegheny to Johnstown in Cambria county, with a view of connecting these streams by a canal or rail road; to survey . . . from Lewistown by the Kishcoquillas creek and through the valley of that name to the town of Huntingdon; to survey . . . from some point on the Schuylkill Canal to a point or points on the Susquehannah river between Catawissa and Sunbury, with a view of connecting these points by a rail road; to make further surveys of the valley of the Allegheny from the mouth of the Kiskiminitas to the mouth of the French creek, with a view to make a canal, or slack water communication, for steam or other boats."

The wording used by the legislature in authorizing canals, authorizing the construction of canals, authorizing the letting of contracts for construction of canals, and authorizing surveys with the view to constructing canals, received varied and often incorrect interpretations by the people back home. It might have sobered local canal advocates, had they read the new laws more perceptively before setting off jubilant community celebrations.

The entire plan for Pennsylvania's system of public works was pretty well determined before the legislators went home in 1828. People along upper reaches of the Susquehanna River's west branch still argued that the best route to the Allegheny and Lake Erie lay along their stream, but the canal diggers continued clawing their way up the Juniata. Later sessions of the legislature were largely concerned with extending existing sections of canal toward previously determined goals, and with finding funds to keep work moving.

The Act of April 23, 1829 required the commissioners, among other things: "to locate the route of a suitable navigation either by canal or slack water, between Pittsburg or the mouth of the Kiskiminitas and the borough of Erie", and "to improve the navigation of the Monongahela river from the city of Pittsburg to the Virginia line, at such time and in such manner as the Legislature may hereafter direct." The legislature, for the third successive year, ordered the commissioners to improve the Monongahela, while still making it clear that the time to start actual work had not yet arrived.

Each succeeding year a larger amount of money was borrowed, but it was never quite enough either to keep pace with the canal board's expenditures or to satisfy the clamor of the citizens for additions to the basic transportation plan. Audits and controls of state finances were negligible and ineffective. When the commissioners found that all available money had been spent, they promptly notified the contractors, who often continued their work secure in the knowledge that the legislature at its next session would set everything to rights. By the close of 1829 the state's program of public improvements had cost $8,260,000 in borrowed money; an additional $1,398,790 in debts were outstanding; and contracts for $2,060,742 more were in force. Governor Shulze admitted that "it must be apparent to all that economy has rarely entered into the system of expenditure, but that prodigality and profusion have, on the contrary, been its distinguishing characteristics."

Illustrating this "prodigality and profusion" the politicians of Lewisburg wangled an appropriation for a cross-cut canal to connect their village with the West Branch Canal on the other side of the Susquehanna. Three locks, three-fourths of a mile of canal, and an expensive river dam were built, at a cost of more than $150,000, to satisfy this determined little band. Many other communities, similarly situated, pulled strings to obtain their own cross-cuts and branches, but not always with the same success.

Governor Shulze commented, uneasily, that the money already borrowed should have been enough to finish all of the remaining work; and perhaps it would have been if the legislature had not gone right on approving additional projects, and if construction costs "had not generally exceeded what had been usual or was expected."

Governor Wolf, who succeeded Shulze in 1829, told the legislature in his financial report that the "situation of the contractors on the several divisions of the canal, and those employed by them, is represented as being in the highest degree distressing; and that immediate relief is indispensable, as well for the comfort of the individuals concerned as for the honor of the Commonwealth itself." Two months later the legislature arranged for a loan by a direct and simple expedient. It passed a law requiring "the president, directors and company of the bank of Pennsylvania . . . to lend to the Commonwealth . . four millions of dollars, at a premium of five and one half per centum . . . " The bank was required to have an additional million dollars ready for the state on the first day of January of each of the next three years. It was most convenient to have a bank so completely subservient to the will of the legislature. Money obtained by these loans was vested in "the commissioners of the internal improvement fund, to be applied by them to canal and railroad purposes."

Canal commissioners and the members of the legislature were unexpectedly learning that their engineers were outstanding optimists. It was estimated that the Susquehanna Division, from Duncan's Island to Northumberland, could be built for $598,376. Actual cost was $1,039,256. The Juniata Division, as far as Huntingdon, was to have cost $1,741,508, but it took almost another million to get the line in operation. It was the same all over the state. The Western Division, from Pittsburgh to Johnstown, estimated at $1,498,810, actually cost $2,873,217. The engineers were not entirely at fault, for some of the costs were unpredictable. When it was needed for the right of way, land that had been considered nearly worthless suddenly became valuable in the eyes of its owners. The commissioners could exercise the right of eminent domain when necessary but they negotiated settlements wherever possible and were frequently obliged to pay premium prices. There was also an epidemic of claims for damages to contend with, damages alleged to have resulted from the construction of the canal. Some of these undoubtedly were reasonable enough, but others were born of opportune avarice. A farmer whose fields along the river had been flooded each spring "since before the memory of man", was likely to complain bitterly if, after the construction of the canal, the drainage of his land was even slightly interfered with. Ways in which residents along the canal could benefit from its construction and operation were limited only by man's ability to imagine and represent new wrongs and torts.

By all reports the contractors were the worst offenders. They all began as novices in canal work and perhaps on occasion they bid too low on contracts. Too often, either to escape bankruptcy or to augment their profits, they "skinned" the work and disguised faulty performance. The engineers in charge had only small supervisory forces and could not maintain rigid and constant inspection all along the line. Before a section of canal could be opened for traffic it was almost always necessary to rebuild a number of its parts. If a contractor abandoned his job because he was losing money, it was necessary to re-advertise for bids and then to re-let the work, usually at a stiff increase over the original price. To avoid delay, the commissioners sometimes re-let a job without the formality of advertising, as often as not to the contractor who had defaulted in the first place. Since relief could be obtained with such ease outrageously low bidding was encouraged.

When the commissioners refused to aid an embarrassed contractor, an appeal to the legislature seldom failed to gain reconsideration. In one typical case a special enactment required the canal commissioners "to examine the claim of Bargy and Henry for damages which they allege they have sustained by pulling down and building up again lock number twenty-eight on the Juniata Divison of the Pennsylvania Canal, if upon examination it shall appear the said lock had been built according to contract when first constructed . . ." It does not seem probable that Bargy and Henry would have been asked to do their work over if it had been done with reasonable care in the first place, but in view of the interest shown by the legislature they no doubt got the settlement they were after.

Wastefully or not, the work went on. The Act of March 21, 1831 authorized the canal commissioners to begin building the Allegheny Portage Railroad. A preliminary authorization had been made three years earlier; now the engineering plans were approved and the job ready to go forward. The same act also authorized construction of a canal from the Ohio River at the mouth of Beaver Creek, to the harbor at Erie, though immediate construction was limited to a 25-mile section between Beaver and New Castle. A windfall in the form of a $300,000 legacy to the state from the Philadelphia banker Stephen Girard provided only momentary respite in the search for funds to complete the internal improvement.

Governor Wolf, in requesting money from the legislature to keep the program going, said rather wistfully: "I feel persuaded that a gradual progressive system of improvement, by means of roads and canals, such as this state might have prosecuted from time to time, without embarrassing her finances, or endangering her credit, would have been her true policy. The great mistake on our part, has been in undertaking too much at once." At the same time he declared his support of a system of taxation for paying the interest on canal bonds and for "improving the credit of the State." He suggested a tax on personal property such as bonds, mortgages and money, which so far had not been taxed in Pennsylvania.

The legislature, and presumably the public, preferred to continue to borrow to pay interest charges, confident that very shortly toll receipts would exceed operating costs sufficiently to meet all obligations. Governor Wolf himself gave evidence of having accepted this view when he delivered his message to the legislature on December 3, 1834. He said that "upon most of the loans negotiated for the construction of the public works, the State received premiums to an amount, in the main, sufficient in connection with other revenues set apart for that purpose, to meet the payment of interest upon the whole amount of the State debt, at the respective periods when the same became due . . . The increase of tolls upon the public works will, it is not doubted, supply the place of premiums hereafter; and it is confidently believed that the people of no State in the Union, in which public works have been constructed at the public expense, have been less burdened with the payment of taxes in proportion to the extent and magnitude of the respective improvements, than the people of this State have been. And such are the flattering prospects in regard to the future revenues which the Pennsylvania canals and railways will produce that it is more than probable that after the twenty-fifth of March, eighteen hundred and thirty-six, taxation for these objects will not be required."

He pointed with pride to the 601 miles of state canals and 119 miles of railways then in operation or soon to be opened. The entire cost had been $22,114,915. It was true, of course, that tolls estimated at a half million dollars for 1834 had amounted to a disappointing $323,535 because of a shortage of boats and cars, drought, and so on, but no "recurrence of such unpropitious circumstances" was expected.

When Joseph Ritner beat Wolf out for governor in 1835, the economy of the state and the nation seemed sound enough, though it was based on the continuous circulation of great quantities of bank notes. These were good so long as everyone accepted them, but many were certain to be found worthless once their validity was challenged. It was a period in which the spirit of the whole country seemed to be elevated by ideas of speculation and easy money. An English traveler described Philadelphia as a "bank-bound city of merchants, whose counting-houses are their churches, whose money is their god and whose ledgers are their Bibles." Governor Ritner in his second annual message seemed to confirm the traveler when he deplored "that desire which is now so ravenous, of acquiring wealth without labor . . . . at the expense of others and without equivalent." His evaluation of the period, with its feverish speculation, fictitious currency, and inflated prices, was made just one year before the day of reckoning when, in the general crash of banks, thousands of firms and individuals found themselves bankrupt. Sound banks, fighting to stay open, called in their loans to protect themselves and so brought on a second wave of bankruptcies.

The legislature met in the following year and, touched by the general distress, appropriated funds with an even more openhanded recklessness. It approved $1,382,044 for new work and repairs on canals and railroads, $116,300 for roads and bridges, $159,000 to aid private turnpike companies, and $295,000 for purchase of stock in canal and railroad companies. The governor would have refused to sign the bill except for the one item of repairs urgently needed to keep the Main Line and its branches in operation. In his last message Governor Ritner remarked sadly: "I once thought that no combination of circumstances would cause me even to hesitate in advocating the speediest means that could be devised for the completion of our noble system of improvement; but the experience of the past two years has, I confess, shaken my confidence in the attainment of this desirable end, within any reasonable period."

Governor Porter, who succeeded Ritner in 1839, lost much of his zeal for public improvements when he came to face the problem of financing them. In his January 1840 message he spoke more realistically than his predecessors, saying: "It has been customary, hitherto, to state the gross amount derived from the canals and railroads, in such a manner as to convey the impression that they yielded that sum, clear of all deductions for management and repairs. The constant yearly increase of tolls has served as a powerful stimulant to the prosecution and extension of the entire system of our improvements. Men of sanguine feelings have confidently looked forward to an early day, on which the tolls arising from our improvements would not only pay the interest on the whole State debt, but yield, in addition, a large surplus to be applied to the extinguishment of the principal. Local interest and ardent public enterprise, readily concurred in this opinion. We had embarked in the system too deeply, both in pecuniary investments, and in state pride to turn back."

Income from tolls for the years 1835 through 1839 amounted to about $4,400,000. Expenses of operations and repairs took nearly $3,870,000 and left only a little more than $100,000 a year to apply against the annual interest of not less than $1,800,000 on the $34,000,000 public debt.

In his message to the 1840 legislature Governor Porter estimated that an additional four-and-a-half million dollars was needed to complete the North Branch Extension from Lackawanna to the New York state line; the Erie Extension from Greenville to Erie harbor; the Wiconisco Canal from Duncan's Island to Wiconisco Creek; and a short rail line to avoid the inclined plane at Columbia. Though the state was facing bankruptcy, the governor continued to urge completion of the canal program. But the facts of life were catching up with the people of Pennsylvania and the time had come for them to be told a little more of the truth. Governor Porter went on to say that the affairs of the Commonwealth "have been for several years gradually verging on towards deeper and deeper embarassment, until we have at length reached this unexpected deficiency of funds in the treasury to meet the demands upon it. The people have been told again and again that our fiscal condition was flourishing and prosperous. while in fact, our prosperity was all based on paper calculations and loans, which loans, we are just beginning to perceive, bear interest, and are some day to be paid." The governor hesitated to recommend the sale of the public works and was opposed to more borrowing, and consequently indicated that taxation was the only expedient solution.

On June 11, 1840 a tax bill was passed "to create additional revenue to be applied towards the payment of interest and the extinguishment of the debts of the Commonwealth." The tax, which fell on real estate, salaries of public officers, and personal property, was not popular with the tax-payers and it was with difficulty collected.

With the financial condition of the state getting worse all of the time, Governor Porter concluded in 1842 that it was time to get out of the transportation business. He declared that if the state were out of debt he would not favor selling any of the public works. Oppressed as the state was, however, its credit gone, unable to borrow any more, he thought it might be wise to get rid of at least the Columbia Railroad and the Delaware Division of the Pennsylvania Canal. A little later he was ready to sell the whole system, and public opinion apparently was coming around to the same conclusion. The legislature obediently tucked two little sections into the most convenient appropriation bill. They gave the governor authority to advertise for bids for the various parts of the "main line of the Pennsylvania canal, and all other branches of rail roads and canals belonging to the Commonwealth." When the bids were opened on July 27, it was found that an offer of $3,000,000 had been made for the Columbia

Railroad, and $10,000 for the outlet lock at Portsmouth (Middletown). These were brushed aside very quickly.

The state's financial affairs came to a final crisis on August 1, 1843, when neither money nor new credit could be found to meet interest on the public debt. Obligations amounting to more than $40,000,000 had been incurred, partly to keep the canal program going, and partly by the multitude of direct grants and stock purchases made to promote private transportation schemes. An emergency issue of notes was made to cover, or at least to recognize, the amounts due. These notes were to draw interest, but at a reduced rate, which greatly disturbed English capitalists who by 1843 had come into possession of many of the state's bonds. Tax collections were more vigorously enforced and the fiscal position of the state was gradually brought into some sort of precarious balance.

With this perhaps over-simplified account of the complicated and perplexing legislative and financial aspects of the canal program in mind, it is time to go back about seventeen years, to consider the actual canals, their design, construction, and operation, in some detail.

CHAPTER IV

BUILDING THE MAIN LINE CANAL

1. The Eastern Division

On July 4, 1826, in elaborate ceremonies at Harrisburg, Governor Shulze turned the first spadeful of earth to mark the start of construction on the Eastern Division of the Pennsylvania Canal. As originally authorized, the state canal was to make a junction with the privately owned Union Canal at Middletown and then run north along the eastern bank of the Susquehanna for 24 miles to Duncan's Island at the mouth of the Juniata. This section of the work lay through gently rolling country and presented little difficulty to its principal engineers, William Strickland and Samuel Kneass.

The standard dimensions of the canal in its cross section, termed the '"prism", were a width of 40 feet at top water line, 28 feet at bottom, and a minimum depth of four feet. To avoid unnecessary excavation and fill the canal followed a "contour" route, skirting the bases of hills and winding with the river to maintain a level grade as long as possible. In some places embankments had to be raised to hold the grade across gullies and hollows. Puddling was necessary where soil was too porous to hold water, as in sand, gravel, or shale. A tempered clay, called puddle, applied to the bed and sides of the channel made it watertight. This clay, sometimes laboriously hauled from miles away, was chopped fine with narrow spades, mixed with water until it was pliable, and then worked into the natural soil. Additional layers were applied until the puddle was two or three feet thick and virtually waterproof. Embankments and fills especially tended to lose a great deal of water by seepage unless treated in this way.

The level of the canal basin at Middletown was 290 feet above tidewater, and the water at Duncan's Island 42 feet higher. Obviously the canal could not readily be built at one level for the entire 24 miles. Instead, the section was divided into seven reaches, or levels, joined by six locks. There was also a lock with a three-foot lift leading from the canal to the basin at Middletown, as well as two outlet locks, each with a nine-foot lift, from the basin to the river.

The cornerstone of the first lock on the Pennsylvania Canal was laid at the foot of Walnut Street in Harrisburg on March 14, 1827 for what was then called Lock Number Six but later became known as Penn Lock. Governor Shulze, this time with trowel instead of spade, conducted the ceremony according to the ritual of the Masonic order.

The standard lift-lock on the Eastern Division of the Main Line was constructed of cut-stone masonry and was 90 feet long by 17 feet wide, with an average lift of nearly eight feet. The chamber of the lock was provided with a pair of stout gates at each end, designed to swing open upstream. To enable a boat to ascend from one level of the canal to the next, the upper gates and their sluices were closed and the lower sluices opened to drain the water from the chamber. As soon as the water reached the level of the lower section the gates on that end were opened for the boat to enter. The lower gates were closed behind the boat and the upper sluices opened, allowing the chamber to fill and raise the boat even with the section of canal above. The upper gates were then opened and the boat floated out at the higher level.

Lock gates were generally of oak, fitting into recesses of the stone walls when open and closing against sills in the lock bottom when shut. The closing edges of the gates were mitred to fit snugly against each other, to seal off the flow of water from above. Vertical timbers at the hinge sides of the gates turned on iron pivots fixed in the bottom of the lock, while their upper ends were supported by iron straps bolted to the tops of the stonewalls. The gates were opened and closed by long balance-beams which projected over the sides of the lock The sluices for letting water into and out of the chamber were rectangular openings in the lower sections of the gates. These were opened and closed by sliding doors, or "paddles", which the lock-tender could move up or down by adjusting the long rods that projected above the balance-beams. An improved wicket, turning on a center pivot, came into use some years later. These sluices were always below the surface of the water so as to cause as little erosion as possible. It was virtually impossible to open a set of lock gates until the sluices had equalized the level of water above and below them.

Stop-locks, or stop gates, were sometimes provided on long reaches of the canal where lift-locks were far apart. If a break occurred in an embankment, or other emergency repairs were required, the nearest stop-lock could be closed, confining the loss of water to a short length of canal and avoiding the need to drain the entire stretch between lift-locks. A stop-lock was constructed much like a lift-lock except that its two pairs of gates were hinged to face in opposite directions so that the flow of water could be cut off either way. On some canals stop-locks were also known as guard-locks, but the term guard-lock had a more specialized meaning on the Pennsylvania Canal. Here a guard-lock was found at the upper end of a canal section where it entered the slack-water pool of a stream. When the water in the pool was at the same level as in the canal, the guard-lock remained open; when the level of the stream rose the gates were closed. The guard lock then served both to keep excessive water from entering the canal and as a lift-lock to raise boats up to the higher level of the pool.

With the crude tools then available, quarrying the immense quantities of rock needed for the locks, culverts, and other stone work along the canal was a tedious business. Roads had to be made to quarries on hillsides and stone hauled in small lots by horse and wagon to construction sites or to navigable streams on which it could be moved to location by boat. Pennsylvania was already producing a fairly good grade of hydraulic cement, however, for use in under-water masonry. For years it had been thought necessary to import such cement, but during the construction of the Erie Canal Canvass White found rock in the vicinity that made a mortar "'equal to the best in Europe". Pennsylvanians looked around and found equally suitable ingredients right under their noses: by simply burning a selected grade of limestone with an available type of clay they got their hydraulic cement.

When they reached the junction of the Juniata and Susquehanna 15 miles above Harrisburg the engineers ran up against their first major problem. They had to get the canal across to the west bank of the Susquehanna, to a spot from which a newly authorized branch could follow that stream north. The Main Line would turn left across the Juniata and continue west. The great breadth of the Susquehanna at this point made construction of an aqueduct too costly; in addition, some device was needed to channel enough water from the river to feed the canal. It was finally decided to build a dam between the lower end of Duncan's Island and the east bank of the Susquehanna, to form a deep and more or less placid pool across which canal-boats could be drawn from a towing-path bridge.

A dam 1,998 feet long and eight-and-a-half feet high, with a base 30 feet thick, was built of strong timbers filled with broken stone and gravel. A short distance above the dam the canal commissioners then built the first of the series of Clarks Ferry bridges, a covered wooden turnpike bridge with a towpath fastened to the downstream side. This structure was rebuilt nine years later with a double-decked towpath, making it possible for boats to be towed across in both directions simultaneously.

The dam had raised the level of the river enough to allow it to flow directly into the open end of the canal, and thus provided an excellent water supply for the lower section. The volume of water entering the canal during flood periods was controlled by a narrow regulating-lock installed below the river opening, which was just wide enough to permit one boat to slip through at a time. To make it possible at Harrisburg to use water from the canal for power, the channel between there and Duncan's Island was made three feet wider and six inches deeper than the standard dimensions and the canal bed, customarily built level, was given a one-and-one-half inch to the mile pitch.

The Union Canal, after a 37-year struggle, was finally completed and the first west-bound canal-boat left Philadelphia on March 20, 1828, going up the Schuylkill Canal to Reading and over the Union Canal to Middletown where it arrived on March 23rd. Seventeen boats were running on the Union in July and more than 200 by the end of the year, but the connecting section of the Pennsylvania Canal was behind schedule. More than a year later, in its issue of August 11, 1829, the *Harrisburg Chronicle* reported: "In the course of the last week three feet of water was let into the canal opposite Duncan's Island, and the work at Red Hill and Hunter's Falls tested. At both places, it was perfectly water tight. A little more repairing will render the canal fit for navigation from Duncan's Island to Harrisburg. Between Harrisburg and Middletown some repairing is also to be done, but it not expected that many days will be required to do it. The only heavy work is the raising of the dam at Duncan's Island, which is in competent hands". Newspapers of the day were edited by confirmed optimists. It was another year before it could be reported that the "Pennsylvania and Union Canals from Clark's Ferry to Philadelphia, are now in fine navigable order . . . and trade on them has been quite brisk".

Meanwhile another section was put under construction. In 1828 the legislature authorized the extension of the Eastern Division of the canal to a new terminus at Columbia, 18 and 7/8 miles down the Susquehanna from Middletown, from where a railroad connection with Philadelphia was contemplated. This meant that the canal would have to be carried across the Swatara below Middletown by means of an aqueduct. Canal aqueducts were by that time a familiar engineering device. In 1761 the English Duke of Bridgewater had built a stone aqueduct over the Irwell River in order to have a one-level canal all the way from his coal mine into Manchester. People traveled miles to witness the strange sight of boats sailing *over* a bridge instead of under it. The Duke's aqueduct was a complete success and continued in use until it was replaced in 1893. The one built across the Swatara was 300 feet long, carried a channel of water 18 feet wide and four feet deep, with a road bridge attached to one side.

Unavoidably in canal construction, numerous runs and creeks and occasional large rivers had to be bridged by culverts and aqueducts. Furthermore, engineers had to be careful, in laying out a canal along the course of a river, that the new embankments did not damage or ruin good farm land by creating swamps on the high side of the canal. Sometimes if the canal was at a low level small creeks were allowed to flow directly into it, thus augmenting its supply of water. At these points, weirs, waste-weirs, or waste-ways, as they were variously called, were provided to carry off excess water during heavy rainfalls, to prevent overflow onto the towpath and breaks in embankments. These weirs, usually of stone, were placed at every point at which an influx of water could be expected.

The country through which the newly authorized section of canal passed dropped away much faster than the section above it. The water level at the Columbia basin was 52½ feet lower than that of the basin at Middletown where the Pennsylvania and Union canals. met. Two outlet locks, each with a ten-foot lift and measuring 100 by 17½ feet, connected the Columbia basin with the Susquehanna River.

The entire 42.85 mile Eastern Division, including the extension from Middletown to Columbia, was placed in full operation early in 1833. The *Columbia Spy,* for April 13th, reported that "on Tuesday last" the Union canal-boat *Cordelia,* of Reading under Captain Frill, had arrived in Columbia by way of the Union Canal and the newest section of the Pennsylvania Main Line. The *Cordelia,* seven days out of Philadelphia, was the first through boat to reach Columbia from the east.

Locks of the Eastern Division and Distance in Miles from Columbia

Name of Lock		*Name of Lock*	
CHICKIES	2	STEELTON	27
HOG PEN	6	HARRISBURG	29
BAINBRIDGE	11	ROCKVILLE	34
COLLINS	13	DAUPHIN	37
FALL MOUTH	14	TWIN TAVERN	41
BUCKS	17	CLARKS FERRY	43
MIDDLETOWN	18		

2. The Juniata Division

The Juniata Division of the Main Line began officially near the head of Duncan's Island, exactly one and 58/100 miles beyond the Clarks Ferry outlet lock and the pool at the end of the Eastern Division. The intervening reach of canal was administratively a part of the Susquehanna Division, though for convenience writers frequently lump its mileage with that of the Juniata Division. The high outlet lock at Clarks Ferry, together with Raisiners lock half-way up the island, raised the canal 20 feet nine inches above the river pool level. Duncan's Island, nearly two miles long and a half to three quarters of a mile wide, was no longer a true island, the back channel having silted up to join its head with the point of the mainland. This narrow strip enabled the Susquehanna branch to reach the west bank of the Susquehanna River without difficulty. Just before reaching this natural land bridge, however, the Juniata Division swung left from the branch canal, stepped up through a lock, and entered the covered Juniata aqueduct. The aqueduct, a 600-foot long wooden-trough resting on sturdy stone piers, was designed to carry the Juniata Canal from Duncan's Island to the south bank of the Juniata River, which the canal was to trace westward into the mountains. The legislature in 1827 had authorized the first leg of this division, a 45-mile stretch reaching as far as Lewistown, but before work on this line was much more than started, subsequent acts authorized extension to Huntingdon and then to Hollidaysburg, 127.32 miles up the Juniata from Duncan's Island junction.

Laying out a canal along the Juniata River proved to be a much greater challenge to the engineers than the planning of the lower sections along the Susquehanna had been. The course of the Juniata is through rough and mountainous country for most of its length. For long stretches the river parallels the mountains; in places it intersects them, finding passage through extremely narrow gaps. As might be expected, the banks are often precipitous, rocky, and ill-suited to construction of a continuous canal. The rate of rise in the canal from Columbia to the pool at Clarks Ferry was only two feet two inches to the mile, but from the pool to Hollidaysburg basin the average rise was four feet eight inches to the mile.

At North's Island, 19 miles up the Juniata, the narrow water-gap through Tuscarora Mountain made it necessary to swing the canal over to the north bank of the river. An eight-foot dam of timber cribbing filled with stone was placed in the stream at this point to provide a slackwater pool across which canal-boats could be towed. An up-bound boat entered this pool from the guard lock on the southern bank and was towed to the opposite side by an endless rope ferry. There it entered a double-lift-lock to resume its passage westward. Along the land side of this lock was a sluice, or mill-race, that carried the water of the canal to a water-wheel which worked the machinery of the rope ferry. In addition to North's Island dam, that made a navigable pool for the ferry crossing, three other dams were installed in the Juniata below Huntingdon to serve as feeders for the canal, one at Lewistown, one at Newton Hamilton, and a third at the mouth of Raystown branch.

Even following the more favorable side of the river, construction was slowed by quantities of rock that had to be blasted loose, either to open the channel or to make room for a lock chamber. Blasting, in the canal building era, was a slow, tedious, and exceedingly dangerous process. First a hole was bored into the rock, and available iron drills were soft, poorly tempered, and required frequent sharpening at the blacksmith's forge. Two men usually worked together when drilling; one held the pointed iron bar while the other swung a heavy sledge-hammer. The poor devil holding the drill ran the risk of being blinded by flying splinters of stone, or of having his hands smashed or his noggin cracked by a misdirected swing of the maul.

When after hours or even days of laborious drilling the blasting hole was finally deep enough, it was partially filled with gunpowder. A dubious sort of fuse was made by twisting paper that had been soaked in saltpeter and dried. One end of this fuse was thrust into the hole, and the opening than plugged with clay. The "blower" lit the fuse and "ran like hell". If the powder ignited there was a moderately satisfactory explosion, but too often nothing at all happened. The blower would have to creep back and remove the defective fuse, praying the while that the charge wasn't hanging fire and ready to blow up in his face.

Though the canal commissioners were free to develop rivers for slackwater navigation as part of their canal system, they were obliged to keep the river channels open for the use of people who wanted to float their produce to market "in the old fashioned way". Wherever a dam was placed in a river suitable means had to be provided to allow these arks and rafts to get past the obstruction. "Cheap crib locks", 17 by 90 feet in the chambers, were installed for the purpose at both North's Island dam and the dam at Long narrows below Lewistown. They lasted less than a year. Hazard's *Register of Pennsyvania* for 1830 reported that, "in March last, the unusually thick ice of the preceding winter was broken up suddenly by a freshet, which injured both locks so seriously as to render them impassable, and made it necessary to rebuild the one at North's Island."

The problem of keeping lock excavations free from water during construction, particularly those made in the river, was a most difficult one. Contractors found it rough work for the whole length of the Juniata Division, and many of them simply abandoned their sections. The result was delay while the jobs were re-let.

The dimensions of the canal prism on the Juniata Division were the same as elsewhere on the Main Line. The standard lock on the Juniata, however, was 90 feet long by 15 feet wide, or two feet narrower than those on the Eastern Division. Four of these locks were made of solid cut-stone masonry, the one at Mexico being combined with the stone aqueduct there. Seven were of rubble stone, so-called, laid in mortar. Rubble stone was obtained from the handiest outcropping of rock which was often unsuitable for cutting into smooth blocks. The remaining 77 locks on the division consisted of wooden frames, planked watertight with boards four inches thick. The sides were supported by walls of dry masonry and heavy puddling was worked in at the ends to keep the water from escaping through the fill. Hydraulic cement was not always available. Engineer Dewitt Clinton, Jr. (son of the famous New York governor) reported to the commissioners in December of 1828 that "we experienced much difficulty in procuring water cement on the Lewistown section of the canal, and as the mineral is of poor quality, I have considered it best to suspend its use and to depend in all cases on common lime, mixed with pure silicious sand, and protected by thick coats of puddle".

Each lock had a flume, or spillway, along its up-hill side. These were four feet wide and two feet deep, with shut-off gates to regulate the amount of water permitted to pass around the locks.

By the fall of 1829, water was let into the section of canal below Lewistown, though traffic could not continue into the Eastern Division since the aqueduct to Duncan's Island was not yet completed. The *Juniata Gazette* of Lewistown, in its September 24th issue, reported that on "Tuesday morning last the water was on November 1st, the canal-boat *Juniata*, owned by General W. B. from the feeder to the lock at the Gate-House in the Narrows, during the evening and night; the level is now full . . . and parties of ladies and gentlemen . . . yesterday made excursions to and from the lock, on the canal. The news of the letting in of the water was received with great demonstrations of joy. In the evening the town was greatly illuminated . . . and everybody who was not a member of the Temperance Society (and some few of them too) drank success to the canal." More than a month later, on November 1st, the canal-boat *Juniata*, owned by General W. B. Mitchell and described at the time as a packet boat, made the trip from Mifflin to Lewistown where its arrival set off another spontaneous celebration.

The next summer General Mitchell's boat again made history when it was the first to reach Duncan's Island by way of the newly opened Juniata aqueduct. On this occasion, the *Juniata*, carrying 100 barrels of whiskey, was welcomed by Governor Wolf and all of his department heads. By November of 1830 water was being let into the canal above Lewistown as far as Huntingdon though it was not until the following summer that regular operations were maintained.

Construction of the canal along the wild, undeveloped parts of Juniata Valley had proved unusually difficult; when the canal was taken through a populated place, such as Huntingdon, problems of a different sort were encountered. James Clarke, acting commissioner for the division, reported to the canal board on December 5, 1829, "much difficulty and perplexity" in getting through Huntingdon. "Considerable damages" were paid to citizens, "many of whom have shewn a laudable forbearance and even public spirit, under such irritating circumstances as the removal of their out buildings, wells, gardens, etc., which the uncommon formation of a town without alleys rendered doubly vexatious." In the same report, Commissioner Clarke explained that additional expenses beyond the original estimates had been caused by "alterations of roads, fences, and many small jobs consequent upon the completion of the canal, which could not be foreseen or estimated. By changes in the location of the line; by alterations in plans of work; by sickness on the Juniata; by the enhanced price of labour, provisions and horse-feed; by the ice-flood of last spring; and by the unprecedented quantity of public work in progress throughout the United States."

With the canal more or less complete as far as Huntingdon, the commissioners on June 1, 1831 began letting contracts for the last section, that between Huntingdon and Hollidaysburg. Originally Frankstown had been intended as the western terminus of the Juniata Canal. It was then a more important place than Hollidaysburg and three branches of the Juniata River joined near there to form a natural site for a canal basin. But to build the basin at that point would have required taking over a farm belonging to one Jacob Wertz. Mr. Wertz rejected an offer of $10,000 for his land, and John Blair, a member of the legislature from Huntingdon County, used his influence to have the basin, and the end of the canal, located two miles above Frankstown at Hollidaysburg. A century later members of the Wertz family were still being chided by their neighbors for the role Jacob Wertz played in losing this important terminal for his community.

Frankstowners were not the only ones disturbed by this change of plan. The people of Huntingdon protested that so near the summit of Allegheny Mountain there would not be water enough to operate the canal. One civic leader prophesied that "the eyes of the boatman would be blinded by the dust which would rise from the bottom of the basin." As it turned out, the stream feeding the Hollidaysburg basin did get very low during some months, and expensive dams, reservoirs, and feeders had to be provided later to assure an adequate supply of water for the highest section of the canal.

The need for maintaining a sufficient supply of water during dry seasons was a more vexing problem than the disposal of excess flood water. Where neither natural lakes nor year-round streams were available, reservoirs had to be constructed on high enough ground to permit a flow to the summit level of the canal. These reservoirs had to possess rain sheds large enough to supply the equivalent of all water lost to the canal by evaporation from the surface, seepage through the bed, and operation of the locks.

The main basin at Hollidaysburg was 1650 feet long and 120 feet wide. A short feeder led to a smaller basin above, made by damming the Beaver branch of the Juniata to form a pool 850 feet long by 100 feet wide. Additional water to help maintain the necessary level was brought to the basins from the south fork of the Juniata. A one mile feeder from Raystown branch entered the canal a short distance below Huntingdon. The water supplied by these sources was not enough to meet the needs of the canal; the Hollidaysburg basin had low-water problems until new feeders were completed 15 years later.

In the canal section between Hollidaysburg and Huntingdon it was necessary to build 14 river dams, varying from five to 27½ feet in height, to provide pools for the 16 miles of slackwater navigation on that part of the line. Also required were six towpath bridges, to swing the towpath back and forth across the river. The canal followed its own channel only for a little more than 22 miles of this section.

When the line of canal was built away from the river, earth removed from the ditch could be placed along one side to make a solid towpath. In slackwater portions of canal the towpath had to be built at the edge of the river where it was likely to be flooded during high water, and might be swept away entirely when ice moved down in the spring.

The Juniata Division required 88 locks to overcome the rise of 582 feet and three inches in 127.32 miles between the head of Duncan's Island and Hollidaysburg. This meant that a boat had to be put through a lock on an average of every mile and a half. There were 25 aqueducts to carry the canal over the larger tributaries and, at one place, over the Juniata itself. These were usually wooden structures resting on stone piers and abutments and provided channels 18 feet wide. They ranged in length from the 600-footer at Duncan's Island to the single-span 26-footer at Newton Hamilton. Anything under 26 feet was apparently classed as a culvert. As an experiment the aqueduct over Big Buffalo Creek, above Newport, was made of cast iron covered with iron plates and floored with cut-stone laid in cement. Most aqueducts were roofed for their entire length to protect their timbers from the weather. Well over a hundred road and farm bridges were built across the canal to prevent its having the effect of a Chinese wall. One bridge, at Huntingdon, was somewhat unusual in that it pivoted on a pier near the center of the canal so that it could be swung open to allow boats to pass. This span was 44 feet long and eight feet wide.

On November 27, 1832, to celebrate completion of the Juniata Division, the packet *John Blair* left Huntingdon for Hollidaysburg and arrived there the following day. As usual, formal opening did not mean that regular traffic was possible, then or for some months. It was found that several contractors had not "faithfully" done their work. The puddling over a number of culverts had to be replaced to stop excessive loss of water, and some lock walls were so poorly based that they had to be rebuilt. The trunks of many aqueducts were so short that embankments washed out at either end. The Huntingdon *Gazette* reported on May 29, 1833 that "canal navigation was suspended from the 21st to the 27th inst. between this borough and Hollidaysburg, in consequence of a span of the aqueduct near Alexandria having fallen. It was repaired, however, by proper exertions, and ready to pass boats Monday last." On July 17, the *Gazette* noted, with some impatience, "a suspension in canal business for 8 or 10 days caused by BREAKS. When shall we have free and uninterrupted canal navigation?" Finally after all these weaknesses were mended the canal settled down to business, with the risk, of course, that spring freshets or flash floods might expose further defects in the work.

3. The Western Division

The first leg of the Western Division of the Pennsylvania Canal was authorized by the legislature on February 26, 1826, in the same act that ordered construction to start on the Middletown to Duncan's Island section of the Eastern Division. While in the east, the canal was crawling up the Susquehanna and Juniata toward Allegheny Mountain, the Western Division was struggling to reach the same goal from the opposite direction.

Work did not get under way quite as promptly at the Pittsburgh end because there was more debate and confusion over selection of a suitable route. The legislature had authorized a canal between Pittsburgh and the mouth of the Kiskiminetas River, but it continued for some time undecided which side of the Allegheny River was to be followed. There was no possibility here of crossing and recrossing the river at will, as along the Juniata. Fortunately the shortage of competent engineers that had hampered the canal commissioners in some of their early surveys no longer existed. Canvass White, Dewitt Clinton, Jr., Nathan Roberts, and a number of others who had gained experience and made reputations on the Erie Canal were now available. In their report of December 23, 1826, the canal board observed that on April 5th of that year they had "succeeded in obtaining the services of Nathan S. Roberts, Esq., an experienced engineer from the New York canal. He was instructed to proceed forthwith to Pittsburg, and to locate the line of canal from there to the Kiskiminetas."

Mr. Roberts lost no time in starting a grade line from the foot of Liberty Avenue at the Monongahela River in Pittsburgh, and taking it up the east bank of the Allegheny. The farther he went, however, the less he liked what he saw. Before reaching the junction of the Kiskiminetas, he retraced his steps and made a new start along the west bank of the river. In his report to the commissioners he strongly recommended that the canal be built along the latter course and estimated that it could be done for less than half the cost of one on the eastern side where the route was endangered by hill slips and floods, and was "in some places almost impracticable".

The board was ready to accept the report of their engineer and to get on with construction, but "two gentlemen" at this point "appeared as representatives of the citizens of Pittsburgh. They contended, before the board, that by the terms of the law, the canal must commence within the chartered limits of the city of Pittsburg—that to begin on the opposite side of the Allegheny River, beside violating the law, would be a serious blow to the welfare of the city; and that even should the western side be preferred for a portion of the route, the canal must cross by an aqueduct, rather than commence elsewhere than in the city."

The commissioners were considerate enough of these civic feelings to hold up action on selection of a western terminal. They ordered work to begin, however, on that part of the canal route over which there appeared to be no controversy, the section beginning at Pine Creek, in what is now the borough of Etna, and running north along the west bank of the Allegheny. By September 14, 1826, Acting Commissioner Abner Lacock was able to report that 25 miles of the Western Division had been contracted for, and that more than 1,000 men were at work. This covered all of the canal that had been authorized except approximately five miles at the Pittsburgh end.

During the winter 1826-1827 the citizens of Pittsburgh whipped themselves into quite a frenzy over the problem of these five miles. Residents just across the river in the village of Allegheny insisted that since the canal was being brought down the west side of the river it would be an unnecessary and useless expense to extend it to Pittsburgh. They indicated that they were prepared to construct a large basin for the canal terminal, with wharves and warehouses from which freight could be drayed at little cost across existing Allegheny Bridge.

Pittsburghers objected. It was not to benefit a neighboring town that they had agitated ten years for a canal. A committee was sent to the state capital to function as a lobby. Its one job was to make certain that the canal commissioners did not deviate from the expressed intention of the legislature: Pittsburgh was to be the western terminus. In May 1827 the commissioners finally adopted a plan that provided for continuance of the canal along the western side of the Allegheny River to a point opposite Pittsburgh, there to cross into the city and proceed to an outlet on the Monongahela.

The newly incorporated borough of Allegheny succeeded in winning the right to have its own branch and separate terminal facilities, though they would be only a mile or so from the Pittsburgh basin. Beginning where the Main Line turned to cross over to Pittsburgh the three-quarter mile Allegheny "feeder" stepped down to a lower level through two locks and then continued on a course parallel with the river to the Allegheny basin in the center of the borough. From the basin, located near the site of the recent Federal Street Railroad Station, the canal turned sharply left and stepped down through two outlet locks into the Allegheny River. This basin was open and ready for business before the aqueduct to Pittsburgh was completed, and the so-called "first boats to reach Pittsburgh", after the start of navigation on the canal, either got no farther than Allegheny, or reached Pittsburgh only by leaving the canal at the outlet locks and being towed around to Pittsburgh's steamboat wharf on the Monongahela.

The Allegheny canal basin was to prove useful again later when Pittsburgh's aqueduct had to be completely rebuilt; however, for the most part, Pittsburgh virtually monopolized the canal business. Had the Allegheny basin been established as the exclusive western terminal, it is entirely conceivable that, with the rapid expansion that followed the opening of the canal, Pittsburgh might have become the "southside" of the city of Allegheny, and Allegheny "the Steel Center of the World."

A few days after the terminus was officially decided upon, Acting Commissioner Lacock called for proposals for constructing sections of canal of about a quarter-mile each from the mouth of Pine Creek to a point opposite Pittsburgh, and for an aqueduct to cross the Allegheny. The canal archives in Harrisburg show that the contract for the Pittsburgh aqueduct was awarded to William LeBaron and Sylvanus Lothrop on June 3, 1827, for the sum of $100,000, with the stipulation that work was to be completed by the first of March, 1829. The original aqueduct, the largest of those built on the Pennsylvania Main Line, was a wooden trough-like bridge, open at the top, with a sidewalk along one edge and a towpath along the other. It crossed the Allegheny at about the location of the present Pennsylvania Railroad bridge, and consisted of seven spans of 160 feet each. The trunk was of wood, 1140 feet long, 14 feet wide at bottom, 16½ feet wide at top, and 8½ feet deep. Heavy white pine planks, two and a half inches thick, laid diagonally in two courses would, it was hoped, hold the water in the trunk. The main abutment, on the western end, was to have an archway for a "sub-marine" road.

Once across the aqueduct the canal continued at the same grade along Washington Street, now Eleventh, to the main Pittsburgh basin east of the canal between Penn and Liberty streets, then on the outskirts of the city. McGowin's map of Pittsburgh (1852) also shows a smaller basin west of the canal. Warehouses of freight and transportation companies were located along slips or short branches from these basins.

There was a great deal of argument about the canal route between the Pittsburgh basin and Monongahela River. Engineer Roberts had surveyed routes along both Liberty and Smithfield streets, but many Pittsburghers were afraid that an open canal along either of these arteries would interfere with the free growth of the city. Others, looking ahead hopefully to the day when the Chesapeake and Ohio Canal would be extended into Pittsburgh, insisted that a way be found to connect the basin with the Monongahela. The best solution, agreeable to all parties, seemed to be a tunnel route that would leave the basin near Liberty and Grant streets, pass under Grant's Hill, and follow Suke's Run to the river. Mr. Roberts estimated that a route along Liberty and Penn streets would cost $55,567.35, one along Smithfield Street $65,033.28, and the tunnel route $85,767.49. Pittsburgh City Council was more optimistic. In May of 1827 it passed a resolution earnestly requesting the canal commissioners to adopt the tunnel route and pledging the "faith and funds" of the city that any cost beyond the engineer's estimate for the Liberty and Penn route would be borne locally. The canal board accepted Pittsburgh's plan, with the council's guarantee, and contracts were soon let for the work. A stipulation required that construction be completed by March 1, 1829, when it was hoped that the Pittsburgh-Blairsville section of the canal would be ready for service.

The 1827 session of the legislature had authorized a 44-mile extension of the canal from the mouth of the Kiskiminetas, up that stream and its major tributary, the Conemaugh, to Blairsville. The next year a further extension was approved along the Conemaugh to Johnstown. From this point some type of portage would be required to reach the terminus of the Juniata Canal at Hollidaysburg, just over the ridge of Allegheny Mountain.

Construction on the Western Division followed the standard pattern used elsewhere, the prism measuring 40 feet at top water line, 28 feet at bottom, and four feet in depth. The locks, like those on the Juniata Division, were 90 feet long and 15 feet wide. Unlike those of the Juniata, however, all locks of the Western Division were of cut-stone laid in mortar. Engineer Sylvester Welch reported that "the locks on this line have cast iron paddle gates, eight to each lock. The time of filling a lock or of discharging the water, where the lift is eight feet, is about one minute and a half, and a boat can easily pass through in either direction, in three minutes."

The 30-mile section between Johnstown and Blairsville had an average fall of eight feet to the mile, while the lower section from Blairsville to Pittsburgh fell only three feet to the mile. In the entire 103½ miles between the Johnstown and Pittsburgh basins there were 60 locks, exclusive of the four in the branch at Allegheny and the four between the Pittsburgh basin and Monongahela River. Other features included 16 aqueducts, 10 river dams, 64 culverts, 39 waste-weirs, 152 bridges, and two tunnels.

The first tunnel completed on the Western Division was along the Conemaugh below Blairsville in Indiana County. This 1000-footer was cut through a high ridge to avoid following the river on a long meandering loop. It was the third tunnel opened in the United States, earlier ones being at Auburn on the Schuylkill Canal, built between 1818 and 1821, and near Lebanon on the Union, built between 1824 and 1826. The 825-foot tunnel through Grant's Hill in Pittsburgh was the fourth in the country.

The first river dam of the Western Division was at Leechburg, a half-dozen miles up the Kiskiminetas and 36 miles above Pittsburgh. It was 27 feet high, 574 feet long, and not only supplied most of the water needed for the canal between there and Pittsburgh but also backed up water in the river to form a navigable pool reaching seven miles upstream to Apollo. From there to Johnstown the course alternated between sections of slackwater and canal. After leaving the river bed at Apollo the canal followed the north bank past Saltsburg, crossed an aqueduct to the south bank where it entered the Conemaugh tunnel, came out in a river pool which it left briefly to run along the north bank and then crossed to the south bank again, past Livermore, to a point where it entered another slackwater pool. A further stretch of canal carried the channel along the south bank, around the bluff at Packsaddle, and across the Lockport aqueduct to the north bank again. The canal was able to stay out of the Conemaugh for the rest of the distance to Johnstown, except for a brief section of slackwater that was necessary to get past the jutting shoulder of Laurel hill. Slightly more than 27 miles of slackwater were utilized in this section of canal, and the commissioners later said they regretted not having made more use of such pools.

In 1829 the legislature was alarmed to discover that the chief engineers of the canal were being paid as much as $3,000 per year, together with certain travel and living expenses, and at the same time they were acting as paid consultants on other canal projects. A law was quickly enacted to make $2,000 the maximum salary, payable only for time actually worked; and to curtail the payment of "expenses." In the next few months all but one of the principal supervising engineers quit, and younger men moved up into their jobs. Moncure Robinson replaced Nathan Roberts on the Western Division and work went on without interruption.

Workmen to carry on the construction of the Main Line canal were plentiful. Crowds of Irish immigrants were arriving in the state and contractors encountered little difficulty in recruiting adequate labor forces, though the demand was brisk throughout the country because of the widespread canal boom. When an occasional shortage caused a temporary increase in the 75 cents a day wages, more Irish were imported and wages went back to normal. These imports were the notorious "Wild" or "Black" Irish, largely illiterate, Roman Catholic, and full of the brogue. Earlier settlers from the north of Ireland, identifying themselves as Scotch-Irish and Presbyterian, were quick to disclaim any relationship to these new arrivals who, it was generally believed, were ruining the country.

According to T. C. Reed, who lived near Lockport at the time the Western Division was under construction, the Irish diggers were "the filthiest, most ignorant, and uncivilized men that ever Cork emptied into the United States." Soon after they moved into their shanties at Lockport they got out their shotguns and began shooting the poultry running loose in a farmer's barnyard. When remonstrated with, their leader was quoted as replying, "Be jabers, it's a fra country, an' we'll shoot as minny checkens as we plaze."

These unruly "foreigners'" were a constant source of irritation as long as the canal work went on. Sundays and holidays they went in gangs to neighboring towns to look for excitement and they usually found it. Riots were frequent and a broken head was a common complaint. One such ruckus occurred at Lockport during a July Fourth celebration. The Irish attempted to put the speaker off the platform, but, as Reed reported it, they "were driven out of the village, many of them badly used up."

Farmers complained that their fence rails were stolen to provide fuel for the workers' shanties, and that the cart horses used in hauling earth for canal embankments were turned loose at night to graze in their grain fields. One Irishman who had risen to the status of contractor, when threatened with the law because of the damage done by his men, replied defiantly: "Damn ye, bring on yer sheriff, an' I set me han's on him, an' guv him a good batin, an' he'll not trouble me much."

When they were not annoying the local residents the hands, as they were commonly called, were doing hard, back-breaking labor on the canal. For a day's work of 12 hours or more, they received 75 to 87½ cents. But food was cheap and whiskey cheaper. A quart of local rye or a gallon of applejack could be bought for 25 cents, and black-strap (rum and molasses) for three cents a glass.

Many contractors were operating on little or no capital and sometimes there were long intervals between paydays. When pays were delayed, workers lived on the country, and locusts would have starved on what they left. Had these Irish not been toughened by generations of precarious living in the old country, more of them would have found unmarked graves beside the big ditch.

It was the sturdy Irish who did most of the work on the canals and railroads of the Pennsylvania Main Line, as well as on those of neighboring states. And while it may be true that many of the early taverns owed their existence to the thirsty Irish, yet with pick and shovel these men moved a lot of dirt. A laborer was expected to dig in one day the equivalent of three feet of canal, or about 15 cubic yards of earth. The old canal files show that in 1828 excavating was contracted for at rates of 10 cents a yard for earth and gravel, 12 cents for "hard pan", 25 cents for loose rock, and 37 to 45 cents for solid rock. Embankments were built for 12½ to 14 cents a cubic yard while puddling was applied for 15 cents a yard.

Materials were equally cheap. "Best grade" planks, two inches thick and 12 inches wide, were bought at that time for as little as four cents a running foot. Robert Sutton contracted on January 18, 1830 "to prepare water lime or hydraulic cement for the use of the Ligonier Line" (Blairsville to Johnstown). The raw materials for this cement were to be taken according to the terms of the contract "from such beds or banks at or near Johnstown as shall be directed by the Engineers." Sutton was to be paid 21 cents for each "heaped bushel", plus one cent per bushel per mile for delivery to the building sites.

The public was impatient to see its new transportation system in operation and, as was customary, sections were opened as soon as they would hold water. There were always a few last minute repairs to be made, leaks to be stopped. The Sharpsburg section was about completed when a big landslide filled it up again. It took another 90 days to get the channel cleaned out.

On May, 22, 1829, the Pittsburgh *Gazette* reported that water had reached within six miles of Allegheny, and a month later, on June 23d, that "the water has at length arrived within the bounds of Alleghenytown." A few days later, according to the Pittsburgh *Mercury,* the canal packet *General Lacock,* under Captain Leonard, made its first trip into Pittsburgh, starting from a point opposite Herr's Island, only a mile or two above town. On July 23d, the *Blairsville Record* reported that the *Pioneer* and the *Pennsylvania* had arrived in Blairsville. The Pittsburgh *Gazette* of August 11th noted that "the packet boat *General Lacock* and the Pittsburgh and Blairsville packet passed through the river locks—the former descending and the latter ascending—on the 9th." The paper went on to say that "navigation of the canal may be said to have been formally commenced, though some parts of it have been in profitable use for a considerable time past. A canal-boat laden with 130 barrels of salt arrived yesterday from the Kiskeminitas works." A few weeks later, the Pittsburgh *Manufacturer* was reporting canal news routinely. On September 14th "three canal boats arrived in Pittsburgh and five left on the same day"; on the 15th "one canal boat arrived in Pittsburgh, four departed"; and on the 16th "two canal boats arrived in Pittsburgh and two departed". It should be noted again that these boats "arrived" in Pittsburgh only by leaving the canal through the outlet lock below Allegheny's basin, and then being towed around to Pittsburgh's steamboat wharf. Work on the aqueduct that was to carry the canal across the Allegheny River was behind schedule.

After the aqueduct was finally completed and filled with water a big water parade on November 10, 1829, celebrated the entrance of the first canal-boat into the city. The boating season was about over, but in early July of the next year the *Gazette* reported that the western section of the canal "is now the theatre of much bustle and activity. From the 1st to the 27th of June, there were 114 arrivals and 116 departures." The aqueduct, with a sidewalk along one side of its trunk, provided a convenient new crossing for both pedestrian and equestrian traffic, though not for carts or wagons. Tolls were of course collected for this privilege, though the canal archives show that the commissioners at one point ruled that foot passengers could cross the bridge free of charge *to attend church services*. This accorded with the same concession on other Pittsburgh toll bridges. The superintendent for the western end of canal vigorously protested the ruling. He said that the privilege had been granted on these bridges at a time when there were no churches on the other side of the river; now Allegheny had plenty of places to worship, and to allow people to cross the aqueduct on Sunday free of tolls merely invited trouble from drunks and loafers.

The canal from Pittsburgh basin to the Monongahela outlet locks was not ready for some time yet. The first tunnel contractor ran into difficulty and abandoned the project. Then the city and state fell to jangling over responsibility for carrying on. Not until August of 1832 was the Pittsburgh *Statesman* able to announce that boats "have passed through Grant's hill and safely debouched into the Monongahela River. The canal is also generally navigable and an inland trade is brisk. Some skeptical gentlemen have affected not to understand this underground project, but they may now not only see through it, but go through it in a canal boat."

On April 9, 1833 the legislature ordered a suit to be brought against the city of Pittsburgh for the $40,000 difference between the cost of the tunnel route and the estimated cost of the route originally recommended "agreeably to the principles contained in the guarantee given to the Board of Canal Commissioners by said City". Pittsburgh was being asked to pay for a dead horse as the tunnel had proved quite useless. For some reason, perhaps because of the peculiar rock strata of the tunnel, it was almost impossible to keep enough water in the lower end of the canal to operate the four outlet locks along Suke's Run. Additional funds might have been raised and the weakness corrected but proponents of the tunnel route had lost interest in the venture. It was already obvious that the Chesapeake and Ohio Canal, still struggling lamely up the Potomac Valley, would never be brought across the mountains to Pittsburgh. So the tunnel served mainly as a spillway to carry off excess water from the canal basin. There was some suspicion that it also was used by criminals as a hiding place.

Other parts of the Western Division provided their own vexations. The aqueduct at the mouth of the Kiskiminetas was rebuilt twice. In general the trunks of all aqueducts were too short. The high dam at Leechburg and the adjacent lock were badly damaged by floods in 1831 and 1832. The tunnel at the loop of the Conemaugh periodically dropped fragments of rock on the heads of travelers; consequently in 1830-31 it had to be arched with brick for most of its length.

Incidentally, the Leechburg mentioned several times above was named after the family of David Leech, who played a leading role in the development of the canal. His name first appears in documents of the canal archives as having received a small payment for damages done by the canal to his mill property at Leechburg. Later he helped build the big dam in the Kiskiminetas near his home. The same David Leech during the following 30 years was head of one of the largest transportation companies doing business on the Main Line and his town, Leechburg, became an important center for the building of canal-boats.

Various items in publications of the day show that, beginning in autumn of 1830, some traffic managed to get through on the canal from Johnstown to Pittsburgh. Then in May of 1831, the Pittsburgh *Mercury* announced that "7,927 pounds of merchandise arrived in Pittsburgh from Philadelphia, having been but 15 days in passage. The freight was $2.25 per hundred, being $1.25 lower than formerly." These four tons of goods must have been hauled over Allegheny Mountain by wagon to Blairsville from some point, perhaps Huntingdon, on the Juniata Canal. Though a patient and lucky captain might get his boat through from one end of the Western Division to the other, while the waterway was still receiving its finishing touches, it was not until the opening of the Portage early in 1834 that anything like regular and dependable schedules were maintained by freight and passenger transportation companies.

Meanwhile, Blairsville on the Conemaugh was having its day; the six years from the time when the Western Division reached its doors, to 1834 when the Portage opened. The forced use of the turnpike to get the increased number of travellers and volume of freight over the mountain made Blairsville an important depot and, as Sherman Day reported in his *Historical Collections of the State of Pennsylvania* (Philadelphia, 1843), "The place was full of bustle and prosperity. Immense hotels and warehouses were erected, four or five churches were built in three years, property increased in value, and hotels were swarming with speculators, engineers, contractors, and forwarding agents." After the Portage was opened, "The use of the turnpike was to a great extent abandoned, and the merchants and innkeepers of Blairsville were compelled to sit and see the trade and travel 'pass by on the other side'." The canal made and unmade towns very much as new highways do today.

LOCKS OF THE WESTERN DIVISION

(Taken largely from the report of Sylvester Welch to the Board of Canal Commissioners on November 1, 1830.)

No.	*Lift*	*Type*	*Location*
1	12.70	Outlet	Monongahela River, Pittsburgh
2	8.93	Lift	Front and Try streets, Pittsburgh
3	8.96	"	Second and Try streets, Pittsburgh
4	8.43	"	Fourth and Try streets, Pittsburgh
5	6	"	Below Pine Creek, lower Etna
6	8	"	Sharpsburg
7	6	"	Springdale
8	6	"	Lock Street, Tarentum
9	6	"	Mile Lock Lane, Brackenridge

LOCKS OF THE WESTERN DIVISION (CONTINUED)

No.	*Lift*	*Type*	*Location*
10	10	”	Freeport
11		Guard	Leechburg
12	10	Outlet	Apollo
13	9	Lift	
14	9	”	
15		Guard	Near Roaring Run
16	10	Guard & Lift	
17	10	Lift	
18	9	”	
19	8	”	
20	8	”	Saltsburg
21	8	”	
22	10	”	
23	6	”	
24		Guard	Above Conemaugh tunnel
25	10	Lift	
26	10	”	
27	9.25	”	
28	10	”	
29	6	”	
30	0.75	Guard	Opposite Blairsville
31	10	Outlet	” ”
32	8.25	Lift	” ”
33	8	”	
34	10	”	
35	5	”	
36		Guard	
37	11	Lift	
38		Guard	
39	12	Outlet	
40	8	Lift	
41	8	”	
42	7	”	
43	8	”	

LOCKS OF THE WESTERN DIVISION (CONTINUED)

No.	*Lift*	*Type*	*Location*
44	6.65	”	
45	6	”	
46	11	”	
47	10	”	Below Lockport
48	8	”	
49	8	”	
50	8	”	Centreville (now Huff)
51	8	”	
52	7.34	”	Abnerville (15 mi. from Johnstown)
53	6	”	
54	8	”	Rogers' Mill, Nineveh (11 mi. from Johnstown)
55	8.40	”	
56		Guard	
57	8	Lift	Laurel Hill
58		Guard	
59	12	Outlet	
60	8	Lift	
61	8	”	
62	6.75	”	
63	6.75	”	
64	7	”	Near Johnstown

CHAPTER V

THE MAIN LINE RAILROADS

1. The Allegheny Portage Railroad

Long after it was evident that there was no ready access through Allegheny Mountain that would make possible a continuous canal, and even after the project of a four-and-a-half mile tunnel was determined to be impractical, the eastern and western segments of the Main Line continued to be extended toward each other with the mere hope that the problem of this last barrier would be solved in its turn. If nothing else presented itself, a wide macadam turnpike might provide the connecting link and make possible the exchange of freight across the intervening mountain ridge. But an ingenious use of a railroad was proposed as a means of bridging this gap. It was suggested that since the bulk of the freight would be moving from east to west, the downward movement of cars on the western slope could be harnessed to pull up the more lightly loaded east-bound cars. The eastern slope would cause no trouble. Nature had providentially deposited large amounts of coal near the top of the mountain and enough could be mined to load the normally light east-bound freight cars so that they, in descending, would draw up the cars bound for the west. By the time a final decision had to be made, however, the rapid improvement of stationary steam engines settled the question. Connection between the two sections of canal would be effected by a railroad, and steam-power would move the cars up the slopes.

The Board of Canal Commissioners was authorized by the Act of March 21, 1831, to build a portage railroad "over the Allegheny Mountains from the basin at Hollidaysburg in the county of Huntingdon, to Johnstown in the county of Cambria, a distance of 38 miles . . ." Two months later contracts were let for the necessary grading on the Hollidaysburg side of the mountain, and within a short time work was in progress along the entire route.

The Portage, largely engineered by Moncure Robinson and Sylvester Welch, was a difficult and costly construction job. Much of the line was boldly laid out along the edges of precipices and required side-hill cuttings and embankments supported by heavy walls sometimes 100 feet high. The roadway lay through dense and heavy timber which had to be removed before grading could be started. The trees were burnt off as much as possible; any other method would have been too expensive and time-consuming. Many contractors became discouraged in their struggles against this somber wilderness and defaulted on their contracts. Then, inevitably, there were delays while the work was re-let.

As the land was still undeveloped, the state preempted a right of way 120 feet wide. This unusual width was intended as protection against tree-falls from the bordering woods and also to make sure that there would be ample room for additional tracks if, as was confidently predicted, the volume of traffic outgrew the original installation. The 120-foot right of way was cleared of all trees, but only a 25-foot center strip was graded, to allow for two lines of track. The track was laid with a guage of four feet nine inches between rails, and followed what the engineer's report described as "horizontal arcs of circles or their tangents". The rails of the inclined planes were wooden stringers faced with iron bars or straps. Iron "edge" or "bull-head" rails, 18 feet long and weighing 39½ pounds to the yard, were used on the gently sloped grades between inclined planes. These rails rested in cast-iron chairs, which were iron sockets with roughly "U" shaped openings in which the rails were clamped by the insertion of oak keys, or wedges. The chairs were spiked to cross-ties where the road was on top of a high embankment, but on solid ground were attached to stone blocks measuring about three and a half cubic feet. Two holes were drilled into each stone and plugged with oak to hold the spikes driven through the flanges of the chairs. The tendency of the tracks to spread apart was overcome at first by placing, following each pair of stones, a stone block seven feet long and holding chairs at each end. These proved so expensive that wooden cross-ties, usually of oak, were substituted. The first rails used on the Portage were, surprisingly enough, of Welsh manufacture, for the commissioners found that delivery could be made a year earlier from Wales than from mills in this country. The importation of these foreign rails raised a storm of protest, however, and after 1834 all new orders were placed with Pennsylvania mills.

The Portage Railroad during its years of operation was one of the engineering marvels of the country. The famous English canal engineer David Stevenson (uncle of Robert Louis Stevenson), after inspecting the project, said that in boldness of design and difficulty of execution it could be compared with the greatest feats performed in Europe. The most striking features of the road were its 10 inclined planes, five on each side of the mountain. There were 11 levels or grades connecting the top of each incline with the bottom of the next above, and connecting the bottom incline on each side with the canal basin. Going east from Johnstown to the summit, the road climbed 1,173 feet in 26.5 miles; it descended 1,398 feet in 10.1 miles from the summit to Hollidaysburg. At the head of each incline a pair of stationary two-cylinder steam engines were installed. These hoisting engines, each rated at 35 horse-power, were products of Pittsburgh's rapidly expanding engine works. One engine was maintained as a stand-by for emergencies while the working engine moved an endless rope hawser, pulling cars up on one track and allowing others to descend on the adjoining track. Three or four loaded cars could be moved in each direction simultaneously at about four miles an hour. Each of the early four-wheel burden cars could carry about three and a half tons. The end car in each train was always the low "safety car", designed to bring the others to a stop in case of accident to the rope hawser or its fastenings.

Hemp rope between seven and eight inches in circumference was used. (A number of writers have erroneously described this rope as eight inches in diameter!) These rope hawsers were not very satisfactory; when tarred and given the best possible care their average life was about 16 months. The engineers considered covering each incline with a long roof to protect the ropes from the weather. In 1842, however, John Roebling introduced a wire rope which, after some modification of the hoisting machinery, proved successful and became standard equipment.

The inclined planes of the Portage were not unusually steep; the greatest pitch was less than 10%, and the average nearer one inch to the foot. Many grades on the turnpikes were steeper than this. When the stationary steam engines were out of order, cars could be pulled up the inclines one at a time by horses. Grades or levels between inclines were also quite moderately though not evenly pitched; the steepest, at the Hollidaysburg end, had a rise of 40 feet to the mile, and the over-all average was less than 18 feet. Sylvester Welch's report of 1833 makes it clear that grades were divided into sections of varying angles, in some instances level sections intervening between sharper climbs. A typical grade changed its angle three, four or five times.

Harriet Martineau in *Society in America* (London 1837), says that about 300 feet of each grade - at the head and foot of each plane - were made level. This seems reasonable. Level track would be needed where cars were being coupled onto the inclined plane hawsers and where they were being made up into trains for the grades.

By comparison with the Portage, grades on modern railroads are often much steeper: the Pennsylvania Railroad mainline near famous Horse-shoe Curve, climbs at the rate of 95 feet to the mile; and the Baltimore and Ohio Railroad, where it crosses the Allegheny, has one grade that rises 120 feet to the mile. Today's trains of course regularly use pusher engines to help overcome such grades.

Of the four bridges or viaducts on the Portage the principal one, designed by Solomon W. Roberts, crossed the Conemaugh River just above Johnstown and was thought to be the most perfectly constructed arch in the United States. In later years Pennsylvania Railroad trains were at times stopped to permit passengers to admire this famous span. It was destroyed in the Johnstown flood. Near its western end, at the Staple Bend of the Conemaugh, the road also included a tunnel 901 feet long, the first *railroad* tunnel in America. It, too, was of unusually fine construction, arched with cut-stone for 150 feet from each opening.

The commissioners hoped to have the Portage ready for operation by December 1, 1832, but grading and masonry were not completed until late in 1833. By that time the inclined planes had been double tracked, and a single track was about finished over connecting grades. The first passengers to travel over the route were members of the Philadelphia Board of Trade on their way home from a stagecoach tour of western cities "with the view of establishing business relations with the merchants of the Ohio Valley and the Northwestern States." Their trip over the Portage on November 21, 1833, occurred several months before formal opening of this vital link in the state's new transportation system. A member of the delegation recorded that "the train of freight cars had been put upon the road by David Leech. They started in the morning from Johnstown, and about ten o'clock that night our friends, in the midst of a snowstorm, after passing over all the planes, were delivered safely at Hollidaysburg." These first cars over the Portage Railroad carried, in addition to the illustrious gentlemen from Philadelphia, 10 tons of bacon, and thus marked the beginning of a promising freight business.

During the first year the Portage was in operation, transportation companies provided their own cars, and horses to move them over the grades between inclines. There were only 25 cars available on March 18, 1834 when the Portage was officially opened. By the end of the month another 25 were in service and 80 cars were running by April 15th, yet these were not nearly enough to carry all the freight accumulated in anticipation of the opening of the road. To break the jam much merchandise had to be carried in wagons from the warehouses at Hollidaysburg to the canal at Blairsville.

David Leech's Western Transportation Company used three relays of horses to take its cars over the levels of the Portage, and most passenger carriers kept relays waiting at strategic spots. One team of horses usually went the whole way with a train of freight cars and made the round trip in about three days. Horses were hitched in tandem so they could follow the narrow path between the rails. The number in a team was determined by the amount of power needed to pull a particular load up the steepest grade.

The state maintained the roadbed, provided stationary engines at the inclined planes, and collected tolls. In general rail tolls were about double the regular canal rates, for passengers as well as merchandise. Drivers were as independent on the Portage as on the turnpikes. One traveled at four miles an hour and another at three. When a driver thought it time to feed his horses he stopped and fed them, no matter how many trains waited behind him. Until a second track was completed, turn-outs were provided at one-and-one-half mile intervals to allow cars to pass. Halfway posts were placed in the centers of these stretches so that, when drivers met, the one who had passed the post had the right of way and the other was obliged to turn back to the last siding. The road was crooked and visibility limited; yet drivers raced to get to halfway posts ahead of cars coming from the other direction, and the accident rate was alarmingly high.

Late in the spring of 1835 double tracking of the grades was completed and traffic began to flow in a more orderly manner. The situation was futher improved when the state began to supply locomotives for hauling cars over some of the longer grades. Starting schedules were established, with a system of priorities. The United States mails got first preference, passengers next, and then the burden cars. Within these classes, locomotives took precedence over horse-drawn cars.

The first locomotive purchased for the Portage Railroad was the "Boston", built in Boston, Massachusetts, by the Mill Dam Foundry Company. It was delivered just before the winter close of navigation in 1834, and after being put in condition, was sent to Pittsburgh to be used as a pattern. The "Boston" was placed in service on the longest level of the Portage on May 10, 1835, and proved quite satisfactory, working steadily until the first of November with only two-and-one-half days out for repairs. Two other engines delivered early the same year, the "Delaware" and the "Allegheny", built by Edward A. G. Young of Newcastle, Delaware, were not so successful. The "Delaware's" crank axle snapped after four days and the "Allegheny" lasted only two weeks because of the same structural weakness. In 1839 horses were still in use on the shorter levels, but 17 locomotives had taken over all car hauling on the three longest levels. At the western end of the road, on the 13-mile stretch between the head of the first plane and the foot of the second there were 10 locomotives, including the "Boston" and the rebuilt "Delaware" and "Allegheny". Three locomotives worked the grade between plane four and plane five, and four others were on the Hollidaysburg end. One of the better-known engines, the "Conemaugh", was affectionately dubbed the "Coffee Pot". Not until 1850 was the last horse retired and the Portage motive power provided entirely by steam.

2. The Columbia and Philadelphia Railroad

While construction of a railroad portage, with cumbersome inclines and horse-drawn cars, seemed the best means of continuing the Pennsylvania Main Line over Allegheny Mountain, reasons for a railroad connection between Columbia and Philadelphia were far from obvious. The Union and Schuylkill canals, though privately owned, already provided the necessary link between the Susquehanna river at Middletown and Philadelphia. True, the Union Canal had narrow locks compared with those of the Pennsylvania Canal, and the Union was subject to serious water shortages; but these weaknesses were eventually corrected for only a fraction of the money that was spent on the Columbia and Philadelphia Railroad. The legislature at the time, however, was in a spending mood and not inclined to reject any strongly supported transportation project. The Columbia Railroad scheme was pushed vigorously by the politically powerful residents of Lancaster County and of other localities along the proposed route. They wanted to be on the Main Line, and they got what they wanted even though it added further complications to an already complex undertaking.

In 1827 the canal board was ordered to make surveys and estimates for both canal and railroad from Philadelphia through Chester and Lancaster counties to the Susquehanna. The commissioners lost no time in reporting back that a railroad was deemed most expedient because the intervening hilly territory would make a canal both difficult and expensive. On March 24, 1828 the legislature approved extension of the Pennsylvania Canal from Middletown to Columbia and construction of a railroad from Columbia to Philadelphia. Within two months the commission's engineers had laid out 20 miles of the new road east of Columbia, and contracts for grading were let early the next year.

James M. Swank, in his *Progressive Pennsylvania* (Philadelphia, 1908) says that numbers of the "farmers along the line of the Columbia Railroad were opposed to its construction because they believed that it would interfere with the sale of horses, oats, and other farm products which were needed in the operation of the Lancaster Turnpike, and which also gave employment to them as wagoners." The decision had been made, however, and neither the Union Canal nor the Lancaster Turnpike but the Columbia Railroad was the final link in the state's line of "internal improvements" between Pittsburgh and Philadelphia.

The eastern terminus of the Columbia Railroad was to be at Vine and Broad streets, according to a May 1832 ordinance of the Philadelphia Council, but it was extended to Vine and Cedar before the formal opening. Eventually the tracks reached the docks along the Delaware to provide easier handling of through freight. From Broad Street the road followed the abandoned right of way of the defunct Delaware and Schuylkill Canal to the Schuylkill River. After crossing the Schuylkill on a 984-foot viaduct the first of the Columbia Railroad's two inclines was encountered, the Belmont Plane, 2,805 feet long and 187 feet high. From White Hall Station to Columbia the road was along the general course now followed by the main line of the Pennsylvania Railroad. The second plane, 1,800 feet long and 90 feet high, was descended just before reaching the canal basin at Columbia. These inclines, operated by huge stationary engines, were never very satisfactory; they were expensive to maintain and the cause of many delays to traffic.

During 1829 most of the grading was completed on the 20-mile section beginning at Columbia and on another 20 miles at the Philadelphia end. The legislature doled out appropriations in such niggardly amounts that progress was slow, but by May of 1831 grading contracts had been let for the rest of the road and on September 20, 1832, the 20-mile section at the eastern end was opened for traffic. Before the Columbia Railroad was completed and placed in operation a number of lateral extensions were under way, two of the most important being to York and Gettysburg.

It was intended that horses would pull the cars on the grade between the two inclines and it was optimistically predicted that "a good Pennsylvania farm horse" would be able to pull a ten-ton load "a distance of 27 miles per day with ease". The railway was considered a public highway, with the state's interest limited to collecton of tolls. Anyone could put his own vehicle on the rails and operate it much as he pleased. The resulting bedlam, brawling, and ill feeling were said to have been indescribable.

At the time the road was under construction locomotives were still in the experimental stage and a really satisfactory model had not yet been developed. In the summer of 1832 the Norris locomotive "Green Hawk" left the top of the Belmont incline at 10 o'clock in the morning pulling a platform car loaded with excursionists. This may have been the first use of an engine on the state railroads. The "Green Hawk's" tender soon ran out of fuel and fence rails were lifted along the right of way to fire its boilers during the rest of the trip. The abbreviated train covered the 18 miles to Green Tree by 4 o'clock in the afternoon. Its water had given out and the passengers formed a bucket brigade to haul water from the nearest well. The party was returned to the starting point by 9 o'clock that night, having traveled 36 miles in 11 hours.

Three horse-drawn coaches arrived at Columbia from Lancaster on Monday, March 31, 1834, marking the completion of a single line of track from Philadelphia. April 15th was then set for the formal opening of the road and Governor Wolf, the canal commissioners, and other distinguished personages came down to Columbia, by way of the Pennsylvania Canal, for the celebration. They were driven to the head of the plane in carriages, where a train with a new Norris locomotive, the English-built "Black Hawk", waited, steam up and ready to go. The Norris people had hauled the "Black Hawk" to Columbia part of the way by turnpike to have it in readiness for this momentous occasion.

The governor's party was taken to Lancaster in one hour, where a stop was made overnight. The next day the trip was continued from Lancaster to Philadelphia, with great crowds of people welcoming the officials at every town along the way. Even some of the more conservative residents of Philadelphia turned out and exhibited what might almost be termed violent bursts of enthusiasm. As a cautious pendant, as insurance against a major fiasco, a horse-car without passengers and supplied with relays of horses followed closely after the governor's train the entire distance from Lancaster to Philadelphia, but the "Black Hawk" made it triumphantly all the way. Less than six months later, on October 7, 1834, the show was reenacted with even greater fanfare when double-tracking of the road was completed.

As soon as the road was opened the volume of business was so heavy and the competition so bitter that the state was forced into buying locomotives to haul the cars furnished by individual shippers. Six months after the grand opening of the line, with the completion of the second track and delivery of the first large batch of locomotives, traffic began to move more reasonably and expeditiously. The "Black Hawk", of opening day fame, had proven a failure but the success of the "Lancaster", an engine delivered in 1834 by M. W. Baldwin of Philadelphia, encouraged the state to order twelve more locomotives: six from M. W. Baldwin, four from Robert Stephenson, of England, and two from Coleman Sellers and Sons, of Philadelphia. Nine of these engines were at work on the road by June 1, 1835, and the number was steadily increased. The following year the Norris Locomotive Works brought out their "George Washington", the first engine that could pull loaded freight cars up the steeper grades without an excessive amount of huffing and puffing.

The canal commissioners, on March 28, 1836, were obliged to rule that all locomotives must leave Belmont Plane between four and ten in the morning and between five and eight in the evening. The last one out in each period was to carry a special signal to let everyone know that it was safe to start out with horse-drawn cars. Even with this separation of traffic by type of motive power, there were many delays to passenger trains because of the absence of cross-over switches that would allow them to pass slower trains moving in the same direction.

There was so much doubt that locomotives could pull their trains on wet tracks that it was first planned to use them only in fair weather and to use horses when it rained. Then one summer a plague of grasshoppers made the tracks so slippery that the engines could do no more than spin their driving wheels. Someone thought of sprinkling sand on the tracks and it worked. Since then, sanding devices have become standard equipment on all railroad engines.

The earliest locomotives were wood-burners but anthracite coal was successfully introduced in 1838. The following year bituminous coal, from the western end of the state, was shown to be of even greater utility. Horses were not banned entirely until April 1, 1844, when the state assumed exclusive right to provide motive power for all cars being moved between Belmont Plane and Columbia. The original rails were replaced with the new style "T" rails in 1846, and in 1850 the dispatching and control of trains was considerably improved with the establishment of a telegraph line along the right of way.

With the completion of the Main Line by the opening of the Columbia Railroad on April 15, 1834, a word is in order on the conflicting reports of distances by various writers. On first thought, there would be an exact and unequivocal answer to the simple question - how long was the Pennsylvania Public Works, railroad, portage, and canals, from Philadelphia to Pittsburgh? It proves to be a difficult question to answer. The lengths of the different Main Line divisions given by the canal commissioners in their construction reports were not always consistent but these can be summarized as follows:

Philadelphia and Columbia R. R.	81.75	miles
Eastern Division	42.85	"
Duncan's Island (Susque Div.)	1.58	"
Juniata Division	127.32	"
Allegheny Portage R. R.	36.69	"
Western Division	105.00	"
Total Main Line	395.19	miles

The Main Line mileage of 395.19 as drawn from the commissioners reports was confirmed more or less officially by Governor Porter in 1842 when, in enumerating various state improvements, he referred to the "main line of canal and railway from Philadelphia to Pittsburgh" as being 395¼ miles long. This was a measurement of construction, not necessarily a measurement of travel. For example, the length usually given for the Western Division, 105 miles, included the three-quarter mile Allegheny terminal as well as the three-quarter mile extension from the Pittsburgh basin to the Monongahela River. The travel distance from the Pittsburgh basin to Johnstown was no more than 103.5 miles. The length usually given for the Portage is 36.69 miles, but this included a certain amount of track that over-lapped the canal basins at Johnstown and Hollidaysburg. The distance from the head of the Jonnstown basin to the head of the Hollidaysburg basin was only 35.95 miles. After eliminating another 0.15 miles for over-lapping of railroad and canal at the Columbia basin a reasonably exact *travel* distance of 392.8 miles can be calculated from the Pittsburgh basin to Broad and Vine streets in Philadelphia.

In addition, distances did not remain constant. The Columbia Railroad grew longer with its extension to the Delaware docks; and it was modified again with the improvements which eliminated the Belmont and Columbia planes. After completion of the New Portage Railway in 1855 the Main Line measured a little more than 400 miles in length.

The mileage figures cited by most writers conform closely to those noted above, if allowance is made for the arbitrary rounding off of fractions.

PLANES AND GRADES OF THE PORTAGE RAILWAY

(As reported by Sylvester Welch, Engineer, on November 1, 1833)

From West to East - Johnstown to Hollidaysburg

Plane or Grade	*Length in Miles*	*Elevation Overcome in feet*
Johnstown to Plane 1	4.13	101.46
Plane 1	0.30	150.00
Plane 1 to Plane 2	13.06	189.58
Plane 2	0.33	132.40
Plane 2 to Plane 3	1.49	14.50
Plane 3	0.28	130.50
Plane 3 to Plane 4	1.90	18.80
Plane 4	0.42	187.86
Plane 4 to Plane 5	2.56	25.80
Plane 5	0.49	201.64
Plane 5 to Plane 6 (Summit)	1.62	19.04
Plane 6	0.51	266.50
Plane 6 to Plane 7	0.15	0.00
Plane 7	0.51	260.50
Plane 7 to Plane 8	0.63	5.40
Plane 8	0.58	308.00
Plane 8 to Plane 9	1.25	12.00
Plane 9	0.51	189.50
Plane 9 to Plane 10	1.76	29.58
Plane 10	0.43	180.52
Plane 10 to Hollidaysburg	3.74	146.71
	36.65	2570.29

CHAPTER VI

BRANCH AND INTERSTATE CONNECTIONS

Though not parts of the Main Line, a number of branch divisions and extensions were added to Pennsylvania's canal system, making available to other sections of the state the benefits of this new water transportation. Unquestionably the most important auxiliary lines were those of the upper Susquehanna Valley. The 1827 session of the legislature, while largely concerned with advancing work on the Main Line, provided for the Susquehanna Division Canal to begin at the outlet lock on Duncan's Island, the terminus of the Eastern Division, and to run north along the west bank of the Susquehanna to Northumberland, the junction of the river's west and north branches. This 41-mile section of canal lay through favorable country, with "the bottoms wide and gently sloping to the river, the excavation easy, and the materials for banks good." The dimensions of the Susquehanna Division canal-prism were the same as those established for the entire system, while the 11 locks, 90 feet by 17 feet, conformed to the larger ones of the Eastern Division.

A slackwater pool was created at Northumberland by damming the Susquehanna below the confluence of its two branches. This dam was nine-and-one-half feet high and 2,783 feet long; it had a plank chute near its western end 62 feet wide and 650 feet long to permit the passage of rafts and flat-boats. Like so many of the larger dams constructed at the time, this structure gave its builders a lot trouble. It was built twice and, according to contemporary reports, "each time unfaithfully executed". In addition to providing a slackwater basin around the town of Northumberland, the dam raised the level of the river enough to let water enter the open end of the canal and thus supplied the needs of the lower section as far down as Duncan's Island.

A towpath bridge crossed the pool to the Northumberland side and the junction of the West Branch and North Branch divisions. From there the North Branch Division, begun in 1828 and finished in 1831, followed the north branch of the Susquehanna 55 miles to the feeder dam at Nanticoke Falls. The gentle fall of the river and the generally favorable nature of the country posed few problems for the canal engineers. Only seven lift-locks and one guard-lock were needed to overcome the 69-foot rise between Northumberland and the falls. The dam at the latter place provided a five-mile pool above it, reaching into Wyoming Valley and within two miles of Wilkes-Barre. The Wyoming line of the North Branch Division completed in 1834, carried the channel along the Wilkes-Barre side to a point 16 miles above the Nanticoke dam. This section opened the canal to the shipment of coal from Pittston in the heart of Luzerne County's anthracite field.

Locks of the Susquehanna and North Branch Divisions

Name of Lock	*Miles from Clarks Ferry*
Clarks Ferry	0
Raisiners	1
Buffalo	6
Montgomery	9
Mt. Patrick	11
Lower Liverpool	14
Upper Liverpool	15
Dry Sawmill	17
Mahantango	20
General Williams	25
Port Treverton	27
Shamokin Dam	38
Northumberland	41
Foot of 13 Mile Level	42

Name of Lock	*Miles from Clarks Ferry*
Danville	55
Rupert	62
Bloomsburg	63
Stoney Town	69
Berwick	75
Beach Haven	78
Nanticoke	94

The extension of the North Branch Division from Pittston to Athens and the New York state line was begun in 1836 and after several long interruptions because of financial and other difficulties, was finally placed in operation in 1856. In 169 miles between Northumberland and the state line, 334 feet of lockage was divided among 43 locks, most of which were concentrated in the rugged northern part of the route. Five river dams were built to provide stretches of slackwater navigation, 29 aqueducts were needed, and some 229 bridges.

The 18-mile privately-built Junction Canal in New York State linked the North Branch Extension with Elmira, from where the Chemung Canal went down the side of Seneca Lake to make a connection with the Erie Canal. Another New York canal operated for a season or two along the upper Susquehanna northeast from the state line to Binghamton, from where the Chenango Canal made a more easterly connection with the Erie. The canal-boat *Towanda* may have been the first to open interstate trade between Pennsylvania and New York when in November of 1856 it took a load of anthracite coal from Pittston to Elmira. During the period that this water connection remained open boats from the Pennsylvania Canal wandered over New York's system as far as Buffalo and Lake Champlain. This link proved very important during the Civil War years but was seriously damaged by heavy floods shortly after the war.

The West Branch Division was begun at Northumberland in 1828; seven years later, after a series of extensions had been completed, it reached Farrandsville, a small town 73 miles up the west branch of the Susquehanna. Provision had been made for a further extension of 33 miles toward the mouth of Sinnemahoning Creek, but work was abandoned and local residents had to accept the fact that the West Branch Canal was never to make the long-hoped-for connection with the Allegheny River. The state built a 4-mile side-cut canal from Lock Haven to a point on Bald Eagle Creek and from there a 25-mile water connection with Bellefonte was completed by private investors through the Bald Eagle and Spring Creek Navigation Company. Shorter side-cut connections were also made to Muncy, by a private company, and to Lewisburg by the state.

The Wiconisco Canal was a short but important and heavily used auxiliary of the Pennsylvania Canal. It began on the east bank of the Susquehanna, opposite Duncan's Island, and continued 12¼ miles upstream to the mouth of Wiconisco Creek where it met the Lykens Valley Railroad and thus provided an outlet for the coal fields of Dauphin County. This canal was begun in 1838 by the state, but was finished and put in operation by a private company.

The state-wide canal plan to which the legislature had originally committed itself, had been to build a waterway from Philadelphia to Pittsburgh and Erie; and the people of Erie made it clear that they would be content with nothing less. Western Pennsylvanians supported Erie in its demand for the completion of the canal to the lake, but there was little agreement about the route it should follow. Many people believed that it should proceed northward from the point where the Western Division reached the Allegheny River, following the river to Franklin, thence up French Creek to Meadville, and from there to Erie. Others favored a route from Pittsburgh through Beaver, New Castle, and Conneaut. The latter plan had the support of all loyal Pittsburghers, who felt that their city had a vested right in the Lake Erie trade and saw that the Allegheny River-French Creek route would allow much of this traffic to by-pass Pittsburgh entirely. But everyone was certain, once the Pennsylvania Canal reached the Great Lakes, that much of the business of the northwest would be drawn away from the Erie Canal.

Work was begun on a French Creek feeder-canal in 1827 before it was known which of the proposed routes would be adopted. This 25-mile navigable feeder ran from Bemus' Mill on French Creek above Meadville to Conneaut Lake, the level operations. It was expected to serve whichever canal was finally of which was raised 11 feet to provide a reservoir for canal operations. It was expected to serve whichever canal was finally built, and for a time it seemed that there might be two.

In 1834 the Franklin line was finished from the junction of French Creek and the Allegheny River to its intersection with the feeder. French Creek was dammed in 11 places to provide 17 miles of slackwater navigation; in addition there were five miles of separate canal to carry the channel around the rougher spots. The rise of 120 feet was taken care of by a guard-lock and 16 lift-locks. Completion of this division did not mean that a decision about the route had been reached for while it was under construction work was also in progress on the Beaver line.

In 1831 a program of improvements was undertaken for 30-¾ miles along the Beaver and Shenango rivers, from Beaver on the Ohio River to Pulaski several miles above New Castle. When this work was finished in May 1834, there were slightly more than six miles of canal; the rest was slack-water navigation. The first and second locks on lower Beaver River were made extra large, 25 by 120 feet, to enable small steamers to continue to make use of the river as far as Fallston and New Brighton.

The winter of 1835-36 was particularly hard on canals. Both the Franklin and Beaver divisions were put out of use by the destruction of several dams, locks, and sections of the towing-paths during the spring floods. By June of 1836, the Beaver Canal was back in operation; the Franklin line was never fully restored. There had been great objection by boaters and raftsmen to the placing of dams in French Creek, for it had always been a popular boating stream. The destroyed dams were not replaced, since by that time the Beaver route to Erie was getting stronger support.

In the spring of 1836 an extension of the Beaver Canal was approved. Known as the Shenango Division, it followed the Shenango River 61 miles to Conneaut Lake. Four grist mills were removed to clear the right of way; three others were transferred across the river. The 44 locks on this section were of permanent cut-stone construction.

On July 4, 1838, Thaddeus Stevens, president of the canal board, awarded the first contracts for the Conneaut Division, which, when completed, would take the canal to Erie by way of Conneaut Valley, Granville, Girard, and the lake shore line. Eleven-and-a-half miles were contracted for that year, the remaining 34 miles two years later. This division lay through the most difficult country between Beaver and Erie. Seventy-six locks were needed. They were built entirely of wood and rubble stone, to be some day replaced, it was hoped, by honest masonry. Near the high point of the line there were 21 locks within a three mile stretch, and near Lockport (now Platea) 27 locks in nine miles. To help meet the demand for water arising from all this lockage, a feeder reservoir was constructed near Hartstown, yet water was always scarce in dry seasons.

The state did not complete the Erie Extension. In 1843, after spending more than four million dollars on construction, the whole Beaver and Erie Canal project was turned over to a private company. After the investment of another half million dollars, the canal was finally opened to through traffic in October 1844. By then the season was so far advanced that the first boat out of Erie was "frozen in" on the way south. On April 22, 1845 the first passenger packet reached Meadville enroute from Beaver to Erie.

The 136 mile Beaver and Erie Canal required 137 locks to overcome a total rise and fall of 977 feet. Locks were 15 by 80 feet, or 10 feet shorter than the Main Line standard. There were also at one time 13 dams, 9 aqueducts, 30 basins, and 221 bridges. Slackwater sections accounted for 32 miles of the route.

There was no canal connection between Beaver and Pittsburgh to make the Beaver and Erie Canal an integrated part of the Main Line. Packet steamers carried passengers back and forth on the Ohio, however, and loaded canal-boats were towed from one canal to the other with little inconvenience.

The Delaware Division of the Pennsylvania Canal extended from Bristol to Easton, 59-¾ miles along Delaware River. It had no direct connection with any part of the Main Line, but served almost entirely as a coal carrying link between the Lehigh Canal and the Philadelphia market. Much to the disgust of Lehigh Canal people, who had their own line completed on time, the Delaware Division, authorized in 1827 for completion in 1829, was not opened for its entire length until 1832. The division's 165 feet of fall were taken care of by 23 lift-locks.

It also had a guard and outlet lock at Easton and a tide lock at Bristol. The line made use of nine aqueducts, 21 culverts, 31 waste-weirs, and 110 bridges. A dam across the mouth of Lehigh River raised the level of the water enough to let it enter the upper end of the canal. Much of the channel bottom, however, was sand and gravel and did not hold water very well. Additional water was obtained for the lower section of the canal by a lifting-wheel driven by a wing dam in the Delaware at New Hope.

These were the major divisions and extensions of the state transportation system known generally as the Pennsylvania Canal. There were also a number of smaller feeder canals, such as the 14-mile navigable feeder connecting Kittanning with the Main Line at the mouth of the Kiskiminetas. Some of these feeders were navigable while others were designed only to bring additional water to summit levels. Considering the number of pleas made for cross-cut canals to serve towns off the main canal routes, it is surprising that more of these short lines were not built.

Pennsylvania's system of public and private canals interlocked at a number of points with elaborate networks of canals in adjoining states. The Junction Canal connecting with New York's Erie Canal has been mentioned. Another attempt was made to link the Erie with Pennsylvania's waterways when the Genesee Valley Canal was authorized on May 6, 1836, to run from Rochester, New York, to Olean at the head of the Allegheny River. This 107-mile canal was projected at a time when many people were sure that the Allegheny River would soon be made navigable from Pittsburgh to Olean. Shallow-draught steamboats traveled this route three times in the early 1830's to prove that it was practicable. By 1857, when the Genesee Canal finally crossed the intervening summit into Olean, there still was no assurance that the upper Allegheny would ever again be navigated by anything but flood-borne rafts.

The privately owned Delaware and Hudson Canal was of course a New York as well as a Pennsylvania enterprise. It linked the upper Delaware with the Hudson river and provided a more or less round about route for carrying coal to New York city. Once the D & H canal-boats reached the Hudson at Rondout their loads were shifted to river lighters, craft better adapted to the sometimes choppy New York harbor. Anthracite was carried also down the Lehigh Canal and directly across New Jersey by way of the Morris Canal, which began at Philipsburg across the Delaware from Easton. Another route to the big city market was by way of the Delaware and Raritan Canal, which connected with Pennsylvania's Delaware Division near Trenton and crossed New Jersey, reaching tide-water beyond New Brunswick. These canals were primarily responsible for the early development of the eastern anthracite market.

The Pennsylvania Main Line Canal had only one direct interstate connection, the Susquehanna and Tidewater Canal. The Susquehanna Canal Company was chartered on April 15, 1835 to open navigation along the lower Susquehanna from Columbia to Havre de Grace, Maryland, a distance of 45 miles. Construction, begun on this line in 1835, was completed in 1840, providing Pennsylvania's waterways with access to Baltimore and other Maryland ports. The canal crossed by means of a slackwater pool from the Pennsylvania Canal basin at Columbia to Wrightsville, on the west bank of the river ,and then proceeded south to Havre de Grace; from there canal-boats were towed by steamer to Baltimore.

Two attempts were made by private venture to connect the Pennsylvania Canal with the Ohio canal system. The Pennsylvania and Ohio Canal (or Ohio and Pennsylvania Canal, if you live in Ohio) was completed in 1840 with private funds. It began near Akron, on the Ohio and Erie Canal, crossed the summit at Ravenna and, skirting Youngstown, joined the Beaver and Erie Canal at New Castle. Seventy-three miles of it lay in Ohio and 18 in Pennsylvania. Packets traveled the Penn-Ohio, carrying passengers between Pittsburgh and Cleveland, and freight boats moved large quantities of pig-iron and iron ore. It was on this canal that President Garfield, when a boy, was supposed to have worked as a driver.

Another link, the Sandy and Beaver Canal, was a financial flop. Beginning at Bolivar, a few miles south of Massillon on the Ohio and Erie Canal, it crossed 73 miles of Ohio to reach the Ohio River at the Little Beaver, less than a mile inside of the Pennsylvania state line. It has been said derisively that the only boat ever to make the complete run on this route was sent in 1846 by the contractors to collect their pay. This is not quite accurate because a certain amount of freight and passenger business passed over this route between the Pennsylvania and Ohio canal systems. It is true, however, that it was often difficult, and frequently impossible to maintain a navigable level of water. Through traffic was suspended after only three or four years.

Another disappointment for Pennsylvanians was Maryland's Chesapeake and Ohio Canal. George Washington was among the first to suggest that a canal be dug between the tidewater of Chesapeake Bay and the Ohio River at Pittsburgh. Actual construction of such a waterway began on the Potomac auspiciously enough July 4, 1828. President John Quincy Adams turned over the first spadeful of dirt. Soon hundreds of laborers were working with "the axe and stump-puller, the horse-drawn plow and scraper, shovel, wagon, and wheel-barrow" to excavate the canal ditch. The digging was not always easy since the Potomac, like the Juniata, runs counter to the mountain ranges. Rocky cliffs had to be cut back to make room for the channel. Periodically financial trouble interrupted construction. It was not until 22 years later, October 10, 1850, that the canal reached Cumberland. By then investors had shifted their attention to railroads and all hope vanished that the Chesapeake and Ohio would ever make its way through the mountains to Youghiogheny River and Pittsburgh.

PENNSYLVANIA CANALS: STATE BUILT

Canal	*Miles*
Main Line:	
Eastern Division, Columbia to Clarks Ferry	42.85
Juniata Division, Juniata Aqueduct to Hollidaysburg	127.32
Western Division, Johnstown to Pittsburgh	104.25
Allegheny Outlet, Western Division to Allegheny River	.75
Kittanning Feeder, Kittanning to Western Division	14.00

PENNSYLVANIA CANALS: STATE BUILT (CONTINUED)

Canal	*Miles*
Susquehanna:	
Susquehanna Division, Clarks Ferry to Northumberland	41.00
North Branch Division, Northumberland to New York State Line	169.00
West Branch Division, Northumberland to Farrandsville	73.00
Bald Eagle Cut, Lock Haven and Bald Eagle Creek	4.00
Lewisburg Cut, West Branch Division to Lewisburg	.75
Wiconisco Line, Clarks Ferry to Millersburg	12.25
Beaver and Erie:	
Beaver Division, Ohio River at Beaver to Pulaski	30.75
Shenango Division, Pulaski to Conneaut Lake	61.00
Conneaut Division, Conneaut Lake to Erie	45.50
French Creek Feeder, Bemus' Mill to Conneaut Lake	25.00
Franklin Line, French Creek Feeder to Franklin	22.44
Delaware:	
Delaware Division, Easton to Bristol	59.75
Total	833.61

PENNSYLVANIA CANALS: PRIVATELY BUILT

(All mileage shown is within the state)

Canal	*Miles*
Delaware & Hudson, Honesdale, Pa. to Rondout, N. Y.	25.00
Schuylkill Navigation, Port Carbon to Philadelphia	108.23
Lehigh Coal & Navigation, White Haven to Easton	71.75
Union, Reading to Middletown	77.64
Pine Grove Feeder, Union Canal to Pine Grove	22.00
Conewago, Around Falls of Susquehanna River	1.25
Susquehanna & Tidewater, Columbia, Pa. to Havre de Grace, Md.	30.00
Pennsylvania & Ohio, New Castle, Pa. to Akron, Ohio	18.00
Beaver & Sandy, Glasgow, Pa. to Bolivar, Ohio	.75
Junction, Athens, Pa. to Elmira, N. Y.	3.25
Conestoga Navigation, Lancaster to Susquehanna River	18.00
Codorus Navigation, York to Susquehanna River	11.00
Muncy Cut, Muncy to West Branch of Susquehanna	.75
Spring Creek and Bald Eagle Navigation Bellefonte to Bald Eagle Cut	22.08
Total	409.70

Chapter VII

CANAL PROSPERITY

After the opening of the Main Line Canal Pennsylvania flourished. Merchandise was sent from Philadelphia to Pittsburgh for distribution, by way of the Ohio River and connecting canals, to Ohio, Indiana, Illinois, Kentucky, and the states bordering the Mississippi. In addition to these imported and eastern goods, Pittsburgh sold a large volume of its own products, iron, glass, and coal, for example, to the down river towns, receiving in turn much farm produce for re-shipment to Philadelphia and Baltimore. The attractive freight rates of the canal enabled Pennsylvania quickly to gain the upper hand in its competitive struggle with the wagoners of the National Road. Once again Pittsburgh and Philadelphia controlled the bulk of the commerce to and from the rich Ohio Valley.

The bolder merchants soon were eyeing the lake territory served by the Erie Canal as the next field for conquest. M'Kee, Clarke & Company of Pittsburgh advertised in the *Gazette* on July 12, 1834, that the steamboat *Beaver* would carry passengers to connect with the canal-boat *Alpha,* plying between Beaver and Newcastle on the newly opened Beaver Division. The trip from Pittsburgh to Newcastle, they promised, would be made in 12 hours, which included a one hour lay-over in Beaver for lunch. A line of stages connected Newcastle with Youngstown and Warren, Ohio. The *Gazette* editor commented: "It must, we think, now appear manifest that, if the cross cut canal were completed, New York would be driven out of all competition with Philadelphia for the trade of the country south of Lake Erie." A few days later the Philadelphia *Herald* calmly noted that "Our intercourse with the west, by means of our Railroads and Canals, is every day becoming of more importance. On Friday and

Saturday of last week, and Monday of the present, among other articles, there arrived at this city from Pittsburgh, 99 hhds. of Tobacco, 72 sacks of Wool, 12 hhds. of Bacon, and upwards of 2,900 lbs. of Sole Leather."

But Pennsylvania's gain was at the expense of others. Baltimore's complaint was quoted in the Pittsburgh *Gazette*: "It is in vain that we deceive ourselves, or attempt to disguise the fact, that cannot be denied, that a large quantity of Tobacco, and other produce, is now on its way from Pittsburgh to the Baltimore market, *by way of Philadelphia,* and that goods from Baltimore destined for the West, can be carried cheaper, *by way of Philadelphia,* than direct by wagons! Under these circumstances, can we retain that share of the Western trade that we have hitherto enjoyed?" And business was just as depressed at the western end of the National Road; a Wheeling newspaper lamented in 1835 that "since the completion of the Pennsylvania canal much of the produce of the West, which before sought the New Orleans and Baltimore markets, has been drawn to Philadelphia. We have heretofore mentioned that two steamboats have commenced running the present season between Bridgeport, opposite Wheeling, and Pittsburgh, to carry produce to the canal spoken of; and we have now to add that one will in a few days commence its regular trips between Warren and Pittsburgh." The writer concluded on an optimistic note: "We hope to see, in two or three years, this western trade which Philadelphia is thus diverting, restored by the completion of the Baltimore and Ohio railroad to its natural channel."

The shift in business that brought gloom to Wheeling brought only joy to her long-time rival Pittsburgh. In April of 1839 the *Gazette* chortled happily, "we have never witnessed such a display of business as is this day made at our landing along the Monongahela River. The whole extent of the landing from the bridge to Ferry Street, appears to be covered with packages of merchandise, bales of cotton, bacon in casks, flour, corn, lead, hemp, pig-metal and a variety of other articles, while the carts, drays, etc., keep up a continual bustle, passing and repassing between the river and the canal basin . . . "

In that year, 1839, there were 30 to 35 canal-boats entering or leaving the Pittsburgh basin every day. About 120 boats were running on the Pittsburgh end of the canal; some of them, of the portable type, continued over the Portage to Philadelphia. Isaac Harris' *Pittsburgh Business Directory* for the same year listed 11 different transportation firms and their local agents. All but one or two of these companies were engaged in moving goods or passengers the entire length of the Main Line. The 1841 *Directory* gave a still longer list of these firms and identified the boats belonging to each. The *Western Transportation Line,* more commonly called Leech's Line, had 19 boats: four express packets of the *John Hancock* and *John Adams* class; four slow packets, such as the *Swan* and the *Pittsburgh;* five combination freight and passenger boats, including the *Juniata* and the *Highlander;* and six regular freight boats among which were the *Lafayette,* the *Kentucky,* and the *Conestoga.* The *Patent Portable Boat Line,* operated at different times by the firms of *James O'Connor; O'Connor, Atkins and Co.;* and *Taafe, O'Connor and Company;* owned 16 boats. Portable boats also were used by the *Reliance Portable Boat Line,* with 15 freight and packet boats, and the *United States Portable Boat Line,* with five boats. Nine boats were listed for the *Union Line,* nine for the *Mechanics' Independent Line,* seven for *Bingham's Line,* five for the *Pennsylvania and Ohio,* and five for the *Despatch.* Harris also noted that in addition "there are sundry transient boats running in connection with regular lines, and others on their own account." Three smaller firms that might have been included in the list of those operating out of Pittsburgh about that time were the *Hollidaysburg Line,* the *Pilot Transportation Line,* and *Johnson and Company's Line.* A short time later, certainly before 1845, the *Citizens' Portable Boat Line* entered the carrying trade, followed by the *Boatmen's Line* and the *Merchants' Portable Boat Line.* Others running at one period or another included the *Pioneer,* the *Perseverence,* the *Ohio and Kentucky,* and the *Good Intent.* Many of these so-called "lines" were associations of independent boat owners formed to acquire car and warehouse facilities on the Portage.

The larger companies ran their boats on regular daily schedules, unlike the river steamers, which left only when they had loads. Harris commented that the steamboat lines "have no set hours for departure, but leave generally, after the arrival of the Canal Packets from Philadelphia."

Fahnestock's *Pittsburgh Directory for* 1850 indicates that by that year there was considerable activity on the canals connecting Pittsburgh with the north and west. *Bidwell's Lines* operated between Pittsburgh and Cleveland, between Pittsburgh, Meadville and Erie, and over the Sandy and Beaver Canal. The firm of *Clarke, Parks & Co.*, had the *Express Packet Line* and the *Erie and Michigan Line* running to Erie and the *Union Line* to Cleveland.

The Main Line Canal, in its era of prosperity, seemed a wonderfully busy trade artery, a strikingly progressive innovation indeed. Back-country residents, infrequently glimpsing the marvelous new waterway, were awed by the swirl of activity at the locks and wharves. During the busy season, in daylight hours, boats could be seen passing along the canal in one direction or the other at intervals of 15 to 20 minutes. One boat scarcely got out of sight before another came into view. In a typical year more than 3600 boats arrived at Hollidaysburg from the east, an average of 17 boats each week-day of the 36 week season. Two or three of the daily arrivals were first-class passenger packets, the rest were freight or combination freight and passenger boats.

There were days when as many as 100 passengers reached Hollidaysburg to take the Portage west, though ordinarily the number was much smaller. Freight boats, the large with the small, brought in loads averaging about 45 tons, well under the theoretical limit. Each year more than 130,000 tons of goods moved westward through this most constricted part of the transportation system. East-bound freight brought the total annual volume to more than 200,000 tons. Because of stort-haul business in and out of the city terminals, as well as that originating on lateral lines, freight clearing in and out of Philadelphia and Pittsburgh was considerably greater than that at Johnstown or Hollidaysburg.

Tolls were collected for most items on a schedule of rates based on the ton-mile. The charges first announced by the canal commissioners in 1829 assessed flour, meat, cheese, beer, salt, and fish, as well as "agricultural productions" and household furniture, at the rate of two cents a ton-mile. Pig-iron and broken castings were listed at one-and-a-half cents, coal and iron ore at one cent, and sand, clay, earth, gravel, bleached ashes, and manure at only three-fourths of a cent. The highest rate, four cents, was collected on such things as valuable furs and peltry, though common deer, buffalo, and moose skins were passed for two-and-a-half cents. Queensware, a term that seems to have been used loosely at the time to cover most types of chinaware, went at three cents the ton-mile.

Tanbark, somwhat curiously, was assessed at two-and-a-half cents per cord if carried in boats, but at four cents if on rafts. Also timber, whether "round or square", was rated per 100 cubic feet at one-and-a-fourth cents in downstream boats, two-and-a-half cents in upstream boats, and three cents carried on rafts. The commissioners may have been trying to discourage the use of rafts on the canal; but some of the rate differences suggest that they were still concerned with the competition of those rafters and boaters who floated their craft down the open stream and used the canal for short distances merely to get around dangerous places in the river channel. All articles not enumerated in the official toll schedule were paid for at the rate of four cents a mile when passing north or west and two cents a mile when heading south or east. The concession in toll charges was designed to encourage eastbound shipments.

Canal-boat operators, like the turnpike wagoners before them, found business much better in the Philadelphia to Pittsburgh direction; they frequently were obliged to return their boats east lightly loaded. The Pittsburgh *Gazette* reported on June 23, 1834 that "from the 10th of March, to the 1st of May last, the amount of articles cleared from (the Allegheny collector's) office was 3,490,000 pounds - the amount received there in the same time, was 7,590,000; and since the first of May the amount of freight sent eastward has never, except during one week, equalled one half of the amount of that which came west. Sometimes the amount coming west has been four times as large as that going east." This imbalance of trade was largely a problem of the Western Division of the canal. The volume of freight moving east and west past Harrisburg was more nearly even because of the heavier exports from the Juniata and upper Susquehanna valleys.

Competition was keen among the transportation companies, particularly for freight destined for Philadelphia, as agents strove to avoid sending boats back empty or partially loaded. The enterprising representative of one company learned that a firm along the Ohio was planning to make a large shipment of flour to Philadelphia by way of the Mississippi and the coastal route. An urgent plea to the canal commissioners brought an emergency reduction in tolls and the business was obtained for the canal.

Passenger packets paid 25 cents a mile, or 10 cents a mile for the boat and one cent a mile for each passenger over eight years of age, as the owners elected. The toll was only half a cent a mile for passengers over 12 years of age transported in freight boats. On a packet or freight boat that ran on the canal continuously day and night, or on one belonging to a regular boat line, the captain was required to keep a record of the names of passengers and of the distance each traveled. Once a month or oftener he made an affidavit to a collector and paid the accumulated toll. The canal commissioners, at their discretion, could accept a specified sum as commutation of tolls, and undoubtedly did so for the larger transportation companies. The independent boats, "not usually running in the night time or not affiliated with a regular line", paid toll on passengers in the same manner as on freight. The report of the commissioners for the period of October 31, 1834 to October 31, 1835 showed that 5,920,167 passenger-miles had been traveled north and west, and 5,311,757 south and east.

No attempt was ever made to relate toll charges realistically to canal maintenance and amortization requirements. It was believed that tolls must be kept low to compete successfully with the Erie Canal and with such overland wagon routes as the National Road. Tolls were later made lower still, yet in spite of this total receipts, $250,000 in 1834, the first year in which the entire Main Line operated, increased gradually to almost $1,500,000 in the peak year of 1852. The Erie Canal, operating with much lower rates of toll, produced an income of about one million dollars in 1834, which increased to about three million in 1852.

During this period, the Erie Canal continued to dominate the Great Lakes trade, and New York City, its seaboard terminus, was growing at a tremendous rate. Though Philadelphia never regained from New York its old title of the country's leading business center, it expanded rapidly enough to out-distance all of its other competitors. The following chart shows briefly the decennial population figures for the leading Atlantic ports:

Year	**Baltimore**	**Boston**	**Charleston**	**Philadelphia**	**New York**
1790	13,503	18,038	16,354	42,520	33,131
1800	26,114	24,937	20,473	69,403	60,489
1810	35,583	33,250	24,711	91,874	96,373
1820	62,738	43,298	24,780	112,772	123,706
1830	80,625	61,392	30,289	161,410	202,589
1840	102,313	93,383	29,261	220,423	312,710
1850	169,054	136,881	42,985	340,045	515,547

Charleston's poor showing seems to have been due to a lack of efficient lines of communication with the interior. Boston, though poorly supplied with land transportation, had a unique sea trade for many years.

The canals of Pennsylvania brought an era of expansion and prosperity to towns and villages along their routes, and caused many hamlets to spring up in what, until just before, had been wild and undeveloped country. At the same time, by-passed towns sometimes went into a decline from which they never recovered. Sherman Day, writing in 1843 of Huntingdon County, through which passed about 60 miles of the public works, remarks that the "whole course of business in the county" was changed by this development. "Arks and keel-boats and river-pilots have found their occupation gone. Towns, that once controlled a large share of the business of the county, have lost that business, which has been diffused among small rival places along the line of public works; and small villages have grown into large bustling towns by the impetus of internal improvements."

Hollidaysburg was described in the *Pennsylvania Gazetteer* for 1832 as having only "30 houses, 4 taverns, 4 stores, and 2 smith shops." The United States census for 1850 showed that it had grown to be a town of 2,430 residents. At the other end of the Portage Railroad "Johnstown, or Conemaugh town" was described by the *Gazetteer* as a "post-town" with above "500 inhabitants, and about 60 dwelling houses, 7 taverns, 6 stores, 1 mill and a forge." Locating the new canal basin in the heart of the town occasioned a rapid rise in property values. Johnstown was "regularly laid out, on a plot of upwards of 200 acres of ground, completely surrounded by mountains." By 1850 its population had increased to an official 1,269 persons.

Pittsburgh, at the western terminus of the canal, gained most from the construction of the new waterway, if population figures may be taken as a measure of prosperity and well-being. The 1830 census reported it as having a population of 12,568; Pitt Township adjoining the city, 3,924; Allegheny town, 2,801; Birmingham, 520; and Bayards town, not yet incorporated into the city, 2,125. Twenty years later Pittsburgh itself had a population of 46,601; including its envirous, 73,360. The Pennsylvania Main Line Canal did the job it was built to do.

Chapter VIII

NAVIGATING THE CANAL

"We have today, the pleasure to announce the arrival of the first lot of goods, by way of the Portage Railroad", said the Pittsburgh *Gazette* on March 24, 1834, adding that "It was the General Lacock, Captain Craig, arrived this morning from Johnstown, with goods thirteen days from Philadelphia." This freight must have reached the Main Line by way of the Union Canal or the Lancaster Turnpike since the first track of the Columbia Railroad was not open for business until the following week. Experience was to prove that the delivery of this first shipment in thirteen days was about the fastest freight schedule that could be maintained economically, despite all efforts to speed up the service. The speeds of the packets and freight boats were never much greater than those of the stage-coaches and wagons on the turnpikes. The canal was significant as a new means of transportation because it provided improved comfort for travelers, a tremendously increased freight capacity, and a marked reduction in fares and rates, but its pace was slow and easy.

The canal, like the railroads of the day, was looked upon as a public highway. A farmer felt free to shove his home-made scow into the canal whenever he chose to take a load of produce to town. Or, on occasion, he might put together a raft of rough timber, have his own farm horses drag it along the canal to the nearest saw-mill and then drag back a raft of finished lumber. The farmer was captain for a day.

The Board of Canal Commissioners lost no time in setting up rules of navigation to govern traffic on the new water-way. They directed, for instance, that each boat using the canal be registered with the commission, and that its name and place of ownership be displayed in a conspicuous place in letters at least four inches high. Every boat was required to carry a light on its bow during the night, and every raft a light on its forward end. Square-headed boats or scows had to have circular platforms fastened on their bows "to defend and protect other boats or scows from contact with the corners thereof." No covered or decked boat was to navigate the canal without having a "knife or sharp metallic instrument so affixed upon the stern or bow of the boat, as to cut apart any tow rope which otherwise might pass over the bow." This rule was intended to discourage illegal passing, which was accomplished by swinging the tow-line up in the air instead of waiting while one captain brought his horse to a stop and allowed his line to sink in the water. Each boat was also to have a "guard or plate of iron attached to the keel, and extending under the rudder, in such manner and to such rudder, and effectually prevent the line of any other boat from rudder, and effectually prevent the line of any other boat from entering the same opening."

To protect the mud banks of the canal from being excessively eroded by the wash of passing boats, the canal commissioners established a speed limit of four miles an hour, and speeders were subject to a $10 fine. The limit could be exceeded however, with the written permission of a majority of the commission; and in practice it was exceeded, with or without permission, by all of the first class packets. "For a canal of a given depth", says one authority, "there is a particular speed at which a boat can be hauled with a smaller expenditure of energy than at a higher or lower speed, this maximum being the speed of the free propagation of the primary wave raised by the motion of the boat." The optimum speed, generally between six and eight miles an hour, could be attained only by the lighter draught packet boats. These started off slowly, behind the wave. The three or four horses pulling in tandem were then lashed into frenzied effort and the boat was yanked to the top of the wave where a high speed could be maintained with the least exertion. This system was of course not practical on stretches of the canal where locks were at close intervals.

Passenger boats had the right of way. All other boats, when overtaken between locks, were obliged to steer to the far side of the canal and slacken their tow-ropes so the packets could glide past on the towpath side without changing pace. The packet operators, to permit frequent changes of teams, kept stables of fresh horses at regular relay points. As a result, packets could average 80 to 100 miles a day while the line boats were doing only 25 to 45 miles.

The first-class packet *Pittsburgh* was scheduled to leave the Pittsburgh basin at 9 P. M., and to make the 103½ mile run to Johnstown in 28 hours. This would average about three-and-two-thirds miles an hour, but when allowance is made for time lost in passing through 60 locks and in making 13 changes of horses, it is obvious that the actual speed while moving must have averaged more nearly five miles an hour. Slightly better time was made in the other direction, from Johnstown to Pittsburgh, for the gentle current of the canal and the slackwater sections of the river was a help rather than a handicap.

Passenger boats were scheduled to complete the run from Philadelphia to Pittsburgh in about four days: one company promised to bring its packets through in three-and-a-half. The truth was soon evident to the traveler. Hours were lost waiting for turns at locks, waiting for engines to be repaired on the railroad sections, waiting for washed-out embankments to be rebuilt, and sometimes waiting for enough water to lift the boat out of the mud. Schedules took no account of "unavoidable delays". A representative of Leech's line once calculated that delays, (he called them "detentions"), added up to about four weeks' loss out of each nine month season. These detentions were caused by jams of boats, old boats sinking, breaks in embankments, low water, and so on.

Jane and Samuel McFitridge of Coshocton County, Ohio, traveled over the Main Line in 1841 and later gave the following schedule in a letter to Philadelphia relatives:

Departed Philadelphia	7:30 a.m.	September 13,
Arrived Columbia	10:00 p.m.	September 13,
Departed Columbia	7:00 a.m.	September 14,
Arrived Harrisburg	5:00 p.m.	September 14,
Passed Lewistown		September 15,
Passed Alexandria		September 16,

Departed Hollidaysburg	2:30 p.m.	September 18,
Arrived Johnstown	5:00 p.m.	September 18,
Arrived Pittsburgh	9:30 a.m.	September 20.

This uncomplaining couple made the trip across the state in one week plus two hours.

The completion of the Harrisburg, Portsmouth, Mt. Joy and Lancaster Railroad in 1836 enabled any time-conscious traveler to cut as much as a full day from the Philadelphia-Pittsburgh running time by continuing to Harrisburg by rail. The New York financier Philip Hone took this shortcut in 1847. He made it from Philadelphia to Harrisburg in a breath-taking eight hours, but then, thrown off schedule by several breaks in the canal as well as by other traffic tie-ups, it took him another four-and-one-third days to reach Pittsburgh. There may have been more fortunate travelers.

Passengers transferred from the Columbia Railroad to the Harrisburg line at Lancaster by walking a plank placed between the platforms of cars on adjoining tracks. A certain amount of freight also was moved by rail as far as Harrisburg before being transshipped to canal-boats, even though this entailed a transfer between freight cars at Lancaster; the Columbia Railroad cars were too large for the tunnel on the Harrisburg road.

The freight boats of the transportation companies, the line boats, were described by Horace Greeley, more or less humorously, as the "cent and a half a mile, and mile and a half an hour" boats. Actually, the line boats that traveled the canal continuously night and day averaged close to three miles an hour when on the move; lockage cut this to two and a half miles an hour or less. Speed was not as important to the line boats as it was to the first-class packets, and relays of horses were not found to be economical. Boats usually carried their own six horses or mules. Three were worked at a time in 16-mile stages, that is, for about six-hour stretches.

An examination of old bills of lading shows that the freight boats of the larger transportation companies seldom made the run between Pittsburgh and Philadelphia in less than eight days and the average elapsed time may have been nearer 12 days plus. D. Leech & Co. in 1837 promised to deliver merchandise to Pittsburgh from Philadelphia in "fifteen days, Sundays excepted." The next year James O'Connor's Portable Car Body line advertised that its 15-ton boats were going through to Pittsburgh in five days, while its 30-ton boats were making it in eight. In 1839 John Dougherty promised to deliver goods in Pittsburgh "within twelve days, Sundays and unavoidable delays excepted". In 1846 Bingham's line specified delivery of Pittsburgh goods in Philadelphia "within fifteen days, Sundays excepted." It was a tempo ill suited for the shipment of perishables. Yet, for any but the most urgent cargoes, these sluggish boats delivered their freight fast enough to satisfy a public that could have no conception of the speeds soon to come.

The completion of the Main Line Canal did not bring an end to the use of rafts and flat-boats on the nearby rivers. River locks along the lower Juniata made it possible for free-floating traffic to pass around the ends of the dams built to provide slackwater and feeder pools for the canal. The dams on the Susquehanna were equipped with wide slides or chutes that allowed the free passage of river craft during periods of high water. Once the Main Line was opened, however, most of the rafts and crude boats left the rivers for the safer, steadier, horse-powered canal. Shippers were willing to pay toll for this privilege because it gave them the advantage of an eight or nine month boating season instead of the former brief spring-flood period. By using the canal, timber was delivered to the mills in an orderly flow; otherwise it had to be sent down the river all at one time, with appreciable loss along the way. By canal, moreover, it was taken to a mill upstream almost as easily as to one downstream.

The plan of the canal, with its locks 15 by 90 feet, and its four-foot channel, was calculated to allow the use of 75-ton boats. The largest boat that could be accommodated was about 14 feet wide and 80 feet long, allowing room for the lower gates of the locks to clear the boat when they were swung inward; it drew no more than three-and-a-half feet, fully loaded. Most boats on the canal were much smaller than this because of the seasonal shortages of water and the interruption of freight movements by the rail portages. The cost of transferring shipments between boats and cars at each of the three rail-canal terminals effectively barred the hauling of heavy, low-value freight such as coal and iron ore. Also, Americans had learned from the studies of European canal engineers that: "When a boat is moved in a canal whose cross section does not exceed 6 and 46/100 times the cross section of the boat, and the width of the canal 4½ times the width of the boat, it has a peculiar obstacle to surmount. The water in front will be elevated, and falling from this height it tends to escape along the sides, but it cannot accomplish this as in an idefinite fluid, and carries forward with it a portion, the more considerable, as the interval between the sides of the boat and the canal is reduced." This means that the optimum width of a canal-boat on the 40-foot wide Pennsylvania Canal was about eight-and-a-half feet and, purely by coincidence, this was the maximum width possible when portable boats came into use.

The story of portable boats begins with "the first boat that went over the mountain". Early in the autumn of 1834 Jesse Christman sold his farm along the Lackawanna and prepared to emigrate to new land at Hennepin, Illinois. Instead of making the trip by Conestoga wagon, as had been customary in the pre-canal days, Christman built himself a boat, the *Hit or Miss*, 29 feet long and 7 feet wide. He put aboard his family, household goods, pigeons and other livestock, embarked on his home stream, and then proceeded down the North Branch Canal. At the mouth of the Juniata the boat turned into the Juniata Division Canal and the family continued westward.

Christman intended to sell his boat at Hollidaysburg and ship his effects over the Portage Railroad to Johnstown where he could buy or build another boat for the remainder of the journey. When he reached the canal basin at Hollidaysburg he talked to John Dougherty of the Reliance Transportation Line who suggested that instead of giving up the boat - loaded, it weighed 4570 pounds - he try having it mounted on trucks and hauled over the inclined planes of the Portage. This was successfully done under the "superintendance" of Major C. Williams and, safely returned to the canal at Johnstown, the *Hit or Miss* continued its leisurely way to the Ohio River and Illinois.

The idea of taking boats over the Portage had been kicking around for some time. As early as 1826 Canvass White, the engineer in charge of the canal survey, suggested that section boats might be transported over the then only proposed Portage Railroad. The successful passage of the Christman boat the year the Portage was opened encouraged John Dougherty and other canal-boat operators to develop a portable boat that was to amaze transportation experts both in this country and abroad.

A small canal-boat was built in two sections separated by bulkheads, so that each unit could be mounted on a truck, carried over the Portage, and joined again when returned to the canal. Rails were extended into the basins at each end of the Portage so that the boats, a section at a time, could be floated onto trucks and drawn up out of the water. The two-section boat proved, however, to be too small to be financially successful. The sections could be no more than eight-and-one-half feet wide and still clear the cars passing on the adjoining tracks; and the length of a section was limited by the weight one set of trucks could carry. Various other schemes were tried. One canal-boat was built in eight sections, divided down the center as well as transversely. This monstrosity made only one trial run and then was left to rot on the canal bank. Finally, boats of both three and four sections were found to be practical. When boats of four sections were used, they proved at times so near the absolute capacity of the locks that they had to be worked in diagonally in order to get the gates closed.

Several of the larger transportation companies, such as the Reliance Portable Boat Line, operated these segmented vessels. They advertised that with their type of service the shippers' goods would neither be damaged by excessive handling nor stored and forgotten in a warehouse at one of the canal-rail terminals. Also if one unit sprang a leak, or even sank, the loss would be restricted to the goods in that section.

Competing with the portable boat companies was the Portable Car Body Line, started by O'Connor and Company about 1838. This company advertised service between Pittsburgh and Philadelphia by way of the canal, the Portage, and the Susquehanna Railroad. Car bodies were transferred between railway trucks and flat decked canal-boats by walking cranes. Each boat carried several of the car bodies and, being top heavy, had a characteristic, uneasy roll.

On March 30, 1839 the first iron canal-boat, the *Kentucky*, arrived in Pittsburgh from Philadelphia with 18½ tons of merchandise. The *Kentucky* was a three-section boat and, according to a news item, made the trip in five days and six hours, "deducting delays". All patriotic Pennsylvanians deducted delays when mentioning running time over their sometimes faltering transportation system.

In 1842 a group of companies entered into combination to fix rates at a more profitable level, but so great was the popular clamor that the operators were prosecuted, fined and jailed. Unfortunately for these businessmen, the powers of the courts had been used a few months before to break up a "combination" of workers formed to raise wages. The public professed to see no difference in the two combinations. As a direct outgrowth of this agitation the state inaugurated its own truck service for carrying portable boats over the Portage in 1843. Previously all cars and trucks had been owned by the larger transportation companies and they waged a bitter but hopeless fight against this invasion of their monopoly. The stated purpose of the canal commissioners in furnishing trucks was to "encourage the enterprise of men of small means and to induce them to embark in the carrying trade upon the public improvements".

Though it does not appear that there was much advantage in sectionalizing passenger packets, still this was done about 1843. A traveler then could climb into a section of a canal-boat mounted on wheels, at the Philadelphia terminal and, if he wanted to be so silly, never leave it until he reached the canal basin in Pittsburgh. His "boat ride" would have taken him across 118 miles of dry land, including the highest ridge of Allegheny Mountain.

Numerous attempts were made to introduce steamboats or steam tugs for towing on the canal. In 1834 the *Adaline*, originally a horse-propelled ferry-boat on the Monongahela at Pittsburgh and converted into a makeshift steamer, made a trip to Johnsstopped at each town along the canal and it always tied up at night. Speed had to be kept under four miles an hour to avoid damaging the banks with the wash of the paddles. It took a week to work the *Adaline* up to Johnstown, yet the performance raised hopes for a new form of transportation along the route. The Blairsville *Record* reported the event in these terms: "the Western Division of the Pennsylvania Canal has been navigated by *steam*. Last week a steam canal-boat, (the Adaline) came up from Pittsburgh, and went to Johnstown. She returned on Sunday morning with a load of near 40,000 lbs. of blooms, passing this place very handsomely, at the rate of rather more than 3 miles an hour; and making less wave in the water than a boat drawn by horses. - She is propelled by means of a fixture of peculiar construction, which works in a recess of the stern, entirely under water. The enterprize of the proprietors is worthy of commendation, as well as the hope that it may prove profitable to them."

Sometime after the Civil War the steam propelled *Aetna* carried passengers on the Juniata Division between Hollidaysburg and Huntingdon. After 1872 Captain Robert McFall ran it between Williamsburg and Huntingdon. Steamboats were not so likely to damage the banks on this section of the canal since much of the route consisted of slackwater pools where erosion was not too serious.

Adorning, as it were, the regular trade, floating saloons, store boats, show boats, and even missionary boats did business along the Pennsylvania Canal. The Barnes Department Store boat, traveling the Juniata Division, employed an agent who preceded the boat to announce to the various towns ahead the dates on which it could be expected. The coming of Barnes' boat always excited the women in a community and disgusted the local merchants, who "hated to see the money being taken out of the town".

Pittsburgh had three or four regular market days each week when canal-boats loaded with fresh country produce tied up at the basin. The boats, as well as the adjoining wharves and nearby square, were then abustle with storekeepers, hucksters, and family shoppers. All kinds of farm produce were to be town under the command of Captain Carothers. The *Adaline* found, from dressed chickens to little green onions.

At least one show boat traveled the Main Line, offering a performance of "Ministrels, Ledgerdemaine, and Acts of Trained Dogs, Monkies and White Mice." This popular show was carried in three boats, the *Volney, Voltaire* and *Tom Paine,* towed in tandem when moving from place to place. On reaching a basin, however, they were lashed side by side and opened up to make one large auditorium. For some reason not evident, the novelty of these shows wore off and the public developed a blase' attitude toward legerdemain and white mice. The owner eventually sold two of his boats and made the third over into a traveling grocery store.

Chapter IX

THE CANALLERS

Earthen embankments and raw cuts left exposed by the construction of the canal were soon covered with the natural growth of grass, vine, and shrub; the waterway gradually merged into its surroundings and appeared as though it had always been there. Away from towns the canal was pleasant and convenient for moonlight canoeing as well as for swimming. Covered aqueducts, relatively free of mud, were popular swimming holes and on hot days offered shade and the adventure of climbing and diving from the superstructure.

But in towns and villages, and particularly in basin areas of larger cities, the canal was not always sweet to the nose of the resident. The water often carried in suspension, or floating on its surface, casually disposed of garbage, some sewage, and occasionally the putrid carcass of a domestic animal. Yet, even in more heavily populated places, undrained stretches of the canal froze over in winter to provide excellent skating ponds.

The towpath along the side was a well worn rut that turned quickly to mud in wet weather. Horses and drivers were then forced to edge farther to the right or left to find firmer footing on the turf, thereby gradually widening the towpath. The canal right of way was often the best route to town for pedestrians, horsemen, and even wagon traffic, so that the towpath tended to become a toll-free public highway despite the efforts of the canal commissioners.

The men who worked on the canal were mostly either young and bored with the drudgery of farm life, or older men of the kind who take naturally to a semi-nomadic existence. Many of the "Wild Irish" also stayed around after the waterway was finished, to find jobs as repairmen, lock-tenders, or on the boats themselves. Gaelic names are likely to be predominant on any list of boat captains. About $1,000 capital was enough to set a man up in the freight carrying business with a modest boat and one or two horses. No special examination was required to qualify as captain. Although the greater number of freight boats were either owned by the larger transportation companies or affiliated with them through working agreements, there were many independent boats managed by their owner-captains.

The packet boat captain was a prominent man in his community, for he was known to have a wide aquaintance among the notable government officials, politicians, merchants and iron-masters who traveled by canal. Since the competition for business was keen, he had to exercise the tact and graciousness of a hotel keeper in seeing to it that his passengers were fed well and made as comfortable as possible. And he had his moments of grandeur. When his vessel drew near a lock he shouted through cupped hands to the driver, "S-l-a-c-k!", and unpinned the tow-line with a touch of his boot on a spring-lever. Then as the boat, free of its cable, glided into the lock chamber he gave the curt order for one of the hands to "Snub 'er!" Meanwhile the idlers who gathered to see the packet go through looked on in wistful admiration.

A less flattering opinion of the "quality" of the captains of passenger boats appears in David Stevenson's *Sketch of the Civil Engineering of North America* (London, 1838): "the canal travelling in many parts of America is conducted with so little regard to the comfort of passengers as to render it a very objectionable conveyance. The Americans place themselves entirely in the power and at the command of the captains of the canal-boats, who often use little discretion or civility in giving their orders, and strangers who are unaccustomed to such usage, and would willingly rebel against such tyranny, are in such cases compelled to be guided by the majority of voices, and quietly to submit to all that takes place, however disagreeable it may be."

The freight boat captain was far from the privileged autocrat encountered by Stevenson. When working shorthanded, as was often the case, he stood long watches at the tiller. On occasion he might have to take a turn on the towing-path while the driver snatched a few bites of food and tried to rest his bunions. Martinets are of course found in any type of authoritative position, but most canal captains were complacent, easy-going men whose dealings with the crew were friendly and informal. Their commands were obeyed because they were the employers. The men, however, who could "jump ship" at any point and take to their legs on solid ground, were comparatively free; they scoffed openly at the captain's stories, criticised his method of caulking his own deck, and ridiculed his judgment as a buyer of horses.

The captain of a day boat could manage with a steersman and a driver; the captain of a line boat, running day and night, needed two steersmen, two drivers, and possibly a cook. The passenger boat crew was usually larger than that of the line boat, and sometimes included a scullion or porter-steward, and one or two additional hands. The most fashionable packets carried chambermaids.

Wages were in line with those paid elsewhere at the time. A captain on salary drew about $60 a month, a steersman $25, a cook $20, and a driver between five and ten dollars, usually payable at the end of the season if he lasted that long. *Leech and Company* reported in 1855 that: "We give the captain $135 per month, when he finds hands, tow-lines, and oil. We finding mules and feed. When mules and feed were found by the captain, we paid $220 per month or $8.50 per day." This company, operating on a night and day basis, considered that a captain, two hands and two drivers made a normal crew. Nothing was said about a cook.

It was the duty of the steersman to stand at the helm (or to sit on it if he liked) and to keep the boat from running ashore into the mud. His job was not the snap that it sometimes appeared to be, for on slackwater stretches of the canal he had to pilot his boat with real finesse to avoid shallow bars, boulders, stumps, and snags hidden in the river channel. But when the way was clear and the weather mild, he could smoke his pipe in quiet contemplation, or exchange sallies with the cook through the open hatchway in front of the high tiller-deck.

Cooks were employed on all passenger packets and on combination passenger and freight line boats, but few regular freight boats could afford such extravagance. Many of these cooks were negroes, either legally emancipated or runaway slaves from the bordering states of Maryland and Virginia. Pennsylvania still had 403 slaves when the United States census was taken in 1830, and 64 ten years later, but it is unlikely that any of these were employed on the canal. The kitchen was usually at the rear of the boat immediately in front of the steersman. A short flight of steps led down to this tiny cook-room; the butt of drinking water was often to be found under the stairs.

It was never very difficult to obtain a supply of water, though that in the canal was never used. The water barrel could be filled by dipping a bucket over the side when the boat was passing through a slackwater pool in the river, or when crossing the river by aqueduct. The water in the rivers was still clear in those days and "clean enough to drink". There was always a well or spring near each lockhouse where water could be gotten, but boatmen swore that when such water was put in the boat's barrel it always turned "wormy" in four or five days; river water stayed sweet.

The driver out on the towpath was cut off entirely from conversation with the rest of the crew. Often a mere boy, he was expected to spend six hours without respite, apart from the brief pauses at each lock, on the towing-path. In these six hours he might walk eight or ten miles if his boat was well loaded, and 15 to 18 miles if it was running light. He plodded along behind a chronically tired horse that needed constant reminders to keep moving. The young driver had sometimes to be urged along in turn by the captain; in later days a string of bells on the horses's choke strap helped keep the weary driver from going to sleep on his feet. The "hair pounder" who did the driving for a packet boat using three or four horses in tandem could ride the last animal in the line; the driver of the one-horse boat had no choice but to walk.

By tradition the driver was expected to be alert, while on the towpath, for stray chickens, newly ripened corn, or anything else that would enrich the boat's larder. Food on the freight boats was nothing to brag about, though it improved in later years when more of the captains took their families with them. The Erie Canal custom of taking on a combination cook and mistress never gained much of a foothold on the more tranquil Pennsylvania Canal.

All of the crew ate the same fare, prepared as often as not by the captain himself or, if it was a family boat, by the captain's wife. Bread, fried bacon, and plenty of black coffee was the staple diet, supplemented from time to time by the driver's surreptitious acquisitions.

Boat people in the early days were seldom popular with those who lived along the canal. They were considered boisterous drunkards, brawlers, thieves, and despoilers of decent women; such has always been the judgment of the sedentary righteous upon those who have learned to live without taking root. Farmers swore that the first three rows of corn in a field bordering the towpath were planted for the boatmen. Fences along the canal had a way of disappearing one rail at a time; they made excellent fire wood for stoking the canallers' cook stoves. This became a more exciting game after the canal commissioners ruled that treble the value of the property could be demanded from a captain if a crew member or passenger was caught taking "any rails, boards, planks or staves from the bank or vicinity of the canal." Furthermore, according to the rule, "the possession of such property on board the boat shall be presumptive evidence of the taking." A season spent as a driver on the canal was in many ways a liberal education. As noted earlier one young driver, James Garfield, grew up to be president.

Profanity was common among the boatmen. They blasphemed "in cold blood, without the enthusiasm or scientific precision of the sailor, and without the idiomatic richness of the Californian." In time religious organizations became concerned about these depraved but happy wretches. Sherman Day, writing of Hollidaysburg in 1843, noted that a "missionary of the Seamen's Friend Society labors among the boatmen along the canal."

Life on the canal, though generally peaceful, was not without its peculiar hazards. Captains who carried their families on board had to be alert when bringing their boats into a lock, lest a child fall over the side and drown, or be crushed against the wall of the chamber. Every now and then a boater would slip into the canal in the darkness and drown ignominiously within a few feet of dry land. When the steersman swung the boat from the tow-path, if a green driver failed to have the right amount of slack in his tow-line, the horse might be snapped into the water. The driver as well would be swept in if he was so foolish as to be caught walking between the tow-line and the edge of the water.

E. D. McCafferty relates in *Henry J. Heinz: A Biography* (New York, 1923) that "when Henry J. Heinz was only a small fellow" he was hired "by Pennington Ray, a friend of the family" to help him move his household goods by canal-boat from Freeport to Sharpsburg, 23 miles. The horse-towed boat was brought from Sharpsburg for the purpose. On the way "the tow-horse on which the boy was riding became entangled with the tow-line of a heavy and swift mule-drawn canal 'packet' bound the other way." Young Heinz "slid from his horse just in time. The animal was jerked from the bank into the canal and under the passing boat." On the return trip from Freeport, in typical November weather of snow and rain, he slipped off the deck and got a ducking. Later he drove the horses through cold rain and wind until the boat was frozen in. He got the cargo to Sharpsburg the next morning.

William Orbison, who traveled the canal on a trip from Huntingdon to Washington D. C. in May 1832, noted in his "Record Book" that it was a "pleasant voyage until we reached the aqueduct across the river from Duncan's Island. In attempting to sail through, those on board the boat, of which I was one, narrowly escaped drowning. A part of the acqueduct was defective and immediately after passing the West part, about sixty feet of the bottom fell just behind the boat into the river. The water fell so rapidly that the boat grounded in the aqueduct a few feet from the hole . . ." Mr. Orbison did not exaggerate his perilous experience. Under similar circumstances the bottom fell out of an acqueduct on the Erie Canal and five canal-boats, drawn down by the rushing water, fell through the hole in the bottom of the canal to the creek below. One driver and several mules were drowned.

There was always a real risk in crossing the so-called slack-water pools when the rivers were running at flood. An unusually strong current sometimes swung a boat down-stream to a point immediately below that reached on the towpath bridge by the driver and his horse. A bridge-stick was used in such instances. It took the direct pull and thus prevented the animal from being dragged over the railing into the water. The stick was shaped something like a short canoe paddle, with a stout wooden pin through the center of the blade. The driver looped the tow-line over the upper part of the pin and allowed the under angle of the stick to slide along the inside of the rail as the horse plodded across. As a boat was towed across a slack-water pool in time of flood, the tow-line was hitched about a third of the way back on the near side of the boat. It thus held the craft at the proper angle to the current to move it across the stream almost of its own accord, as long, that is, as the driver with his bridge-stick kept the horse moving at a smart pace. Yet in spite of the efforts of the driver and the use of this ingenious device, boats were swept away while attempting to navigate flooded streams.

The commonest hazards were the many bridges, which crossed the canal every half mile or so. Most of them were low-slung spans with minimum clearance, designed to allow a farmer to get to his fields on the other side. The driver on the towpath was expected to shout "low bridge!" when nearing one of them, to give everyone time to duck. Nevertheless, low bridges caused many headaches and on starless nights an occasional cracked skull. Harriet Martineau, traveling on the Main Line, prohibited books to the members of her party after she "heard of two cases of young ladies, reading, who had been crushed to death."

The bridges were convenient stations from which residents along the canal could drop onto a passing freight boat when they wanted a ride to the next village. Their company was usually welcome to the steersman, who was glad to have someone to talk to as the miles dragged by. When changing drivers the one going off duty could return to the boat by way of the handiest bridge, but it was more difficult to leave a boat in this manner, especially if the boat was loaded and riding low in the water. Then the driver could use a pole to vault ashore and the man coming on board would be obliged to run nimbly up a 16 to 20 foot plank that had one end on the bank and the other on the moving boat. Ordinarily the boat came to a stop only when it was necessary to change horses.

Horses were the motive power for the first canal-boats but mules were soon preferred for freight work because of their greater endurance. The independent boat owner, if reasonably prosperous, owned two animals. While one sorry creature was pulling the boat, the other was in the stable on board, waiting to take his turn. The lives of canal horses were hard and often short. Many of them seemed little more than skeletons loosely wrapped in skin. Their owners fed them reasonably well, but after one horse had dragged a 20 or 30 ton boat a dozen miles or more, even at the sluggish pace of two miles an hour, no amount of food could fully restore his energy before it was again his turn on the towpath. More unfortunate was the plight ot the animal drawing the "one-horse boat": his day's work was continuous. One writer noted that a teamster, hauling on the turnpike with a five-horse team, spread the lash of his whip evenly over the five; on the canal, however, with a lone horse pulling, the driver gave the animal his undivided attention: he had no duty but to beat it from one end of the canal to the other.

In the early days canal horses were stopped at intervals and fed from small portable mangers, but later nose-bags came into common use and the horses could munch their oats as they plodded along, unconscious victims of the speed-up system. Oliver Rice of Port Treverton, one of the few survivors from the late days of the Pennsylvania canals, told the writers that the four mules which pulled the Susquehanna double-boats were sometimes driven without relief for thirty-six hours at a stretch, and fed from nose-bags or with handfuls of hay from the bale customarily carried on board. When, after this arduous grind, the mules were allowed to refresh themselves with a good roll in the dust, they got up restored and "ready to kick".

The harness of a canal horse was simpler than that of a wagon horse, since there was no need for heavy breeching such as is used to hold back a loaded wagon when going down hill. The traces were brought back to what, in canal parlance, was known as a spreader-stick. It was very similar to the swingle-tree that farmers insist on calling a single-tree and was used to spread or hold apart the traces. Short chains from the ends of the spreader-stick came together at a ring or hook where the towing rope was fastened. There is record, reported in the *Cumberland Journal* of

February 10, 1871, of another use for the stick. A canal-boat captain "had started on his downward trip, and had tied up his boat near Oldtown, when he was attacked with a *spreaderstick* and was brutally murdered . . . "

Two horses might occasionally be hitched as a team, side by side, but the usual practice was to drive them in single file, tandem fashion. The traces of the lead horse were brought back to link with those of the one behind. Three or four horses were used for extra speed or when the load was particularly heavy.

When two boats met on the Pennsylvania Canal, the passing rule was for each to "turn out to the right hand, so as to be wholly on the right side of the centre of the canal." Since almost invariably there was a towpath on only one side of the waterway the boat traveling with the towpath on its left was required to swing to the opposite side of the channel. The driver and his team moved to the landward side of the path and stopped, slacking off on the long tow-line until it sank to the bottom, for the oncoming boat to glide over. Boats bound in the same direction passed in a like manner if the captain of the boat being overtaken was cooperative enough to swing wide and halt his driver. When boats met in a narrow stretch of the canal, or at aqueducts, or in any place where the surface width was less than 30 feet, the boat moving upstream was required to stop to allow the descending boat to pass first.

Occasionally to avoid some natural obstruction the tow-path changed from one side of the canal to the other; a crossover or roving bridge was provided to carry the path across. A horse pulling a boat upstream from a right-hand towpath turned left onto such a bridge, turned left again on the other side, passed under the bridge, and then continued upstream on the left-hand towpath without stopping. While the rope was slack, one of the hands swung the hitch from the right to the left side of the boat, since the towing post was normally about one fourth of the way from the bow on the side nearest the towpath.

While still a quarter of a mile away from a lock the steersman sounded his horn, with a "too-too-too-it", warning the lock-tender to prepare the lock for the boat. The horn might be a battered old trumpet or a conch from the seashore, and some of the old boatmen were able to wind a pretty fair tune. On getting closer to the lock, one of the crew sang out a plaintive "L-o-c-k R-e-a-d-y?" Then if the way was clear, the horse would from habit pull up and stop at the proper distance from the lock gates, the tow-line was unhitched and taken on board, and the boat floated into the lock on its own momentum. This was always an occasion for the man at the tiller to prove his prowess by taking the boat neatly into the lock chamber without banging the gates or scraping the walls. The forward movement of the boat was halted by snubbing it to a post at the side of the lock and, if the boat was headed upstream, a rear line was needed to prevent the boat from drifting back into the lower gates. As soon as the water in the chamber reached the new level the gates ahead were opened; and the tow-line was passed to the driver who hooked it up and started off again. The same process was repeated with monotonous regularity, lock by lock, until the boat reached its destination.

As a matter of fact, the tow-line was not invariably unhitched and taken aboard at locks, as described above. The crew of the slower moving, under-manned freight boats more frequently lifted their lines over the balance beams of the lock gates without uncoupling. The length of these tow-lines may have varied to suit local conditions but surviving boatmen affirm that the "65-yard" line was most common. They say also that, when towing in a slack-water stream where brush and snags bordered the towpath, it occasionally was necessary to raise the boat end of the tow-line to the top of a high pole in order to keep clear of the obstructions.

Wharves were built at loading points along the canal, but always on the berm side opposite the towpath. A firm located on the towpath side could obtain loading facilities only by cutting a slip into the bank far enough to admit a boat or two and building a towpath bridge across the slip entrance so as not to obstruct the passage of other boats. In spots without a wharf, where the boat could not be brought to the edge of the water because of the sloping bank, a plank was run ashore for picking up passengers or small shipments of freight. The captain of an independent boat depended mostly on short-haul shipments, so he often stopped along the way to scout for future business. These boats would stop at any convenient place for passengers or freight. Farmers along the route had their own landings and signalled boats to pull in when they had something to send to town. It was said somewhat maliciously of these boats that "if the butter was not ready, they would wait for the churning to be finished. Or if only 11 eggs were ready for the market, the boats would wait for the hen to complete the dozen."

Boats were sometimes moved for short distances on the canal, or from one side to the other, by the use of setting-poles, though this was discouraged. The rules of navigation expressly forbade the use of poles "pointed with iron or metal" because of the danger that the puddling might be pierced, starting a serious leak in the bed of the canal.

There were small harbors along the canal between the larger basins, in which day boats could tie up at night and all but passenger packets lay up over Sunday. Here, in the evening, the crews were to be seen with buckets and paddles, splashing water over the decks and sides of their boats to counteract the drying power of the sun. Later most of the boatmen probably wandered into the nearby village in search of sociability.

The Pennsylvania historian Albert M. Rung wrote the following "bad weather" description of canal life for the Huntingdon *Daily News*: "Boats in transit seldom stopped because of rainy weather. As a means of protection the crew donned oilskins or other waterproof clothing, while the mules at such times were provided with housings of leather or canvas. Thus they managed to move along in a bedraggled way. Sometimes a great deal of water rained into the boats or perhaps leaked in. Then there was back breaking business on hand for young fellows as the water must necessarily be gotten rid of. This was done with suction hand-pumps. Sometimes pumping was made easier by attaching a spring pole to the handle of the pump. The other end of the pole was fastened in such a manner that when the pole was pressed upon its elasticity would cause it to help raise the weight of water."

Rung's article went on to say that in "early spring or late fall the weather was apt to be unpleasant. There were cold, disagreeable days, when the decks were dangerously slippery with frost or snow. Lines were coated with ice and became heavy, inflexible and difficult to handle. In very severe weather the canal was frozen over. Then if the scum of the ice was not too heavy, planks for ice-breakers were fixed to the bow. A number of teams were then used to draw the boat forward with force. In this way the ice was crushed and the channel opened for following craft. When the ice proved to be too thick, the boats were frozen in and navigation was closed for the season. Then there was a merry ride home overland on muleback."

If the freeze-up did not occur unseasonably early the canal usually was drained for the winter to allow necessary repairs to be made. The work of cleaning the accumulated sediment out of the channel was contracted-out in short sections to so-called "mud-bosses". Gangs of laborers, working with spades and wheelbarrows and probably very little enthusiasm, wheeled the muck out of the ditch until its prism was restored to something like its original dimensions.

During the boating season the waterman, or supervisor, made frequent trips on foot along the canal, watching for small leaks that might grow bigger. Where the channel of the canal was above the level of the surrounding land, a leak sometimes developed quickly into a major washout. Small holes were started in the puddle of embankments by muskrats and eels and by boatmen making illegal use of setting poles. When the waterman discovered a small leak he plugged it with stones and straw and then rammed down earth and clay to seal off the flow of water. If a more serious break threatened, a crew of emergency workers was rushed to the scene. A typical incident of this sort was reported in the Pittsburgh *Mercury*, on June 5, 1839. "A break in the canal which threatened serious interruption to transportation and much damage to the improvement, occurred on Tuesday last, about 8 o'clock, at the west end of the Buffalo Creek Aqueduct. We are glad to learn that Mr. Morris, the supervisor, was early on the spot, and by his well timed and energetic efforts, succeeded in arresting the destruction of the canal, and enabled the boats to resume their course on the following morning." The law gave such repairmen the right to confiscate any planks, stone, clay or other material they needed when making emergency repairs, subject to a later settlement of damages.

Philip Hone's *Diary* (New York, 1889) records a canal break or "breach", as well as another kind of interruption, while traveling west from Harrisburg: "The delay on this, the fifth day of our long voyage, is rather discouraging; there has been a breach in the canal, which has caused an accumulation of loaded boats . . . " The next day he noted that the "breach in the canal caused us to stop several hours during the night, and this morning, at sunrise, the 'Commet', a huge coal-boat, had the bad manners to get struck across the canal (what better could be expected from a fellow who spells Comet with two m's?). Here I witnessed a gallant exploit of our captain, - the *raising a swell,* which is thus performed: he puts six horses on the tow lines, backs the boat, and then, dashing on with the fury of the horses in the hippodrome, raises a swell like the waves of Rockaway. The first onset removed the 'Comet' a little from her orbit, and the second carried us triumphantly through the obstacle. The sight of this spirited display of canal tactics compensated for the delay. We sat down to breakfast and went on our way rejoicing."

Among the more important canal officials were the weigh-masters and the collectors. The weigh-master presided over the weigh-lock, constructed on a plan similar to the lift-lock, with the same kind of stone chamber but with the gates at each end facing outward. To determine its weight a boat was floated into position, the gates closed, and the water drained out through a waste-weir, allowing the boat to settle onto the scales. The weigh-master then established the official weight of the empty craft. Some captains were not above such tricks as concealing water or other heavy material inside the hull to increase the net weight of the boat and thus obtain lower tolls later. In the process of determing a boat's tonnage, the weigh-master drove a large-headed brass nail into the hull of the empty craft at the water-line. Then kentledge (pig-iron stamped with its weight) was added, two tons at a time, a brass nail being put in place after each two tons. Every third nail had a specially identified head to mark the water-line at 6, 12, 18 and 24 tons, and so on. The total tonnage of the boat was then marked with white lead on the head and stern, outside and inside, "where most easily to be seen."

Charles Artzt took the contract to build the weigh-lock at Alleghenytown on September 19, 1832. There were others at Hollidaysburg, Harrisburg and Columbia, as well as at other points along the Main Line. There were scales at Johnstown for weighing canal-boats and for weighing the cars used on the Portage. A letter in the canal commissioners files, from John J. Canan, begs them to erect a small stable on the lot at the weigh-master's house in Johnstown as "there is no place even to shelter a cow from the inclemency of the winter." The writer felt sure one could be built for $60 and made available before the cold set in.

Collectors were located along the canal at somewhat more frequent intervals than weigh-masters. On the Western Division, for example, there were collectors at Alleghenytown, Freeport, Blairsville and Johnstown. Tolls were paid at the collector's office nearest the place of loading and boats were not permitted to pass through the locks unless clearances from the collector were shown. The owner or master of a boat on arriving at his destination was required to report to the collector at that point before unloading any part of his cargo. Captains of boats hauling miscellaneous freight picked up and dropped at various intermediate landings, must have had considerable amusement outwitting collectors.

The collectors calculated the tolls due them after examining bills of loading which captains were obliged to show for all freight they were carrying. The brass nail-heads on the side of the vessel gave the collector a rough check on whether or not the captain was witholding certain invoices to avoid payment. A common trick, which collectors soon caught onto, was to load a boat more heavily on the side that would be away from the collector so as to lift the weight markers higher out of the water on his side. In questionable cases the collector, if a weigh-lock was conveniently near, could require a boat to be weighed; or he could appoint someone to examine the load to make sure everything on board had been declared.

When a cargo was made up of mixed items on which the toll was based partly on weight and partly on counting or measuring, conversion tables for calculating tonnage were used. For example, equivalents of one ton were ten-and-a-half barrels of flour, eight barrels of whiskey, 40 bushels of wheat or corn, 50 bushels of barley, and 80 bushels of oats. The more conscientious the collector was in carrying out his duties the more he was hated by the canal boatmen. He represented for most canallers the highest available authority, however, and it was through him that they transacted any business they had with the canal board. The collector received a salary of $1,000 a year and the weigh-master $600, plus rent-free homes, so naturally all such jobs were treated as political plums.

In the commissioners' correspondence file is a letter written by the collector at Blairsville on February 24, 1838, to the effect that Captain Richard Freeland had purchased the boat formerly called "Farmer's Delight" from the owner Robert Getty, and that he wanted to have it called "Savannah". When a canal-boat changed owners it was usual to give it a new name, but there were other reasons for changing registrations. A Juniata captain called his boat the *Lightning Fanny*, since his girl's name was Fanny and his boat a famous "racer". The captain later broke off with Fanny and married a widow; and the *Lightning Fanny* became the *Gliding Susan*. Captains who were family men often named their boats after their children. One father of two little girls, unwilling to slight either one, named his boat the *Kate and Carrie*. Another captain with a boat-load of sons demonstrated his impartiality by calling his vessel the *Five Brothers*.

At the side of the canal near each lock the canal commissioners set aside about half an acre of ground on which to build a lock-house. These rent-free homes must have been a strong inducement to take a lock-tending job, even though the pay never rose above $20 a month. Contracts in the canal commissioners' old papers show that the lock-house designed by Sylvester Welch in 1827 for use on the Ligonier line between Blairsville and Johnstown, was probably a soundly built and comfortable home. The foundation, usually cut into a side-hill or rising ground, was 16 feet wide and 24 feet long, "walled with large and well shaped stones 18 inches thick." The basement, opening at ground level, was divided into storage room and kitchen. There were two rooms with center fireplaces and eight-and-a-half-foot ceilings on the first floor. The low second floor, with only six-and-a-half feet of head room, was undivided. The floors were "planed and laid with match joints" on four by five inch joists. Wall studs were four by five inches and the corner posts were six by six. The interior walls were plastered and the outside ones "planed smooth" and painted with "three coats of white lead and oil." The roof was shingled and water-tight and the chimney laid with stone to the second floor and finished out with brick.

Those were the specifications. The contract for the house at lock number one (known later as number 32) was let at $380; subsequently the bidding became more competitive and the price dropped until the lock-house at number seven (number 40) was taken at $190.50. These astonishing prices covered the cost of all materials, as well as labor and the contractor's profit.

Boatmen commonly believed that all lock-tenders were "touched". Some of the men who manned the locks were solitary and morose and seemed to resent the arrival of a boat as an intrusion on their privacy. Others were contented family men with their yards full of youngsters who providentially escaped tumbling over the unguarded walls of the locks.

The lock-tender had to maintain service 24 hours a day, seven days a week. Unless members of his family could serve in his absence, or he could hire an occasional substitute out of his wages, he not only got no time off from the opening to the closing of the boating season but never dared wander beyond hailing distance of the lock. Most boats traveled on week days only and lay up at least part of each night but passenger packets were likely to appear at any hour of the day or night and were always in a great hurry. The conscientious lock-tender knew the packet schedules and tried to have his lock open and ready.

In dull periods, when no boats were waiting to be locked through, the lock-tender sometimes set a fish line in the canal, or puttered around in his garden plot beside the lock-house. To supplement his meager wage any surplus of fish or garden produce was generally sold to the boatmen. His wife might bake bread or pies for the canallers. Some lock-tenders met the needs of the boat people so well that they built up prosperous little stores as adjuncts to their regular employment.

The lock-tenders' houses frequently became the centers of small communities, for each lock was a focal point of canal activity. Travelers usually walked to the nearest lock to wait for a passenger packet, since these boats rarely made unscheduled stops along the way. Hitch-hikers hung about the locks to cadge rides from the easy-going freight boat captains. A farmer from back in the country would spend several hours at a lock waiting for a boat he favored to come along. He would then dicker over rates on produce he intended for market while the boat was locking through. The lock was a convenient place to cross the canal. When no bridge was handy, the sure-footed could always walk across on the balance beams of the lock-gates. Through his direct contact with the knowledgeable traveling world the lock-tender became the primary news source for his neighborhood. Rumors, reports, election results, all sped along the canal with the fastest packet boat, and consequently the lock-tender was the best informed man in town. In exchange, he posted the boatmen as to what boats were immediately ahead and what hour they had locked through, for each captain was anxious to overtake and pass any slower craft before reaching the next lock. Boatmen left messages with the lock-tender for delivery to boats hours or days behind; and when there was no regular postmaster, the lock-tender frequently performed the function of one gratis.

The lock-tender's official duties did not always make for popularity with the canallers. If his lock was the first following the collector's office he was expected to make sure that each boat had been properly cleared. In the days before the telephone and telegraph, the clarification of a regulation or the settlement of a dispute was not readily passed along to a "higher authority". The lock-tender had to stand on his own feet, and if the canallers found out that he lacked starch, he was at their mercy.

Many stories were told of fights among boatmen for precedence at the locks. Although these tales were undoubtedly exaggerated, and broad generalizations were made from few and isolated epsiodes, there is no question but that the boat crews competed aggressively and sometimes violently for first place at the locks. A rhyme recalled by one old boatman suggests a real brawl at one of the Main Line locks:

"There was a boat comin' up,
and a boat comin' down,
and the Hog-pen lock
turned upside down."

The liveliness of this competition was the direct result of the nature of the artificial waterways themselves and the pace must have been intolerably slow to anyone who wanted to get on. Leaving the Portage, noted Harriet Martineau, there "was again so much hurry - there being danger of either of two rival boats getting first possession of the next locks, that we of the last car had scarcely time to step on board before the team of three horses began cantering and raising a dust on the towing path, and tugging us through the water at such a rate as to make the waves lash the canal bank. Our boat won the race, and we bolted with victorious force into the chamber of the first lock."

The rules laid down by the canal commission were reasonably specific, though their enforcement depended upon the authority and fortitude of the lock-tender. A float (canal lingo for any boat or raft) within 100 yards of a lock in which the water was at the same level was to be passed before a float from the other level. In any other instance, "if on the arrival of two or more floats at any lock, a question shall arise between their respective masters as to which shall be first entitled to pass, such question shall be determined by the lock-keeper, and each float shall be passed in the order and manner in which he shall direct." Thus pontificated the commissioners from their Harrisburg sanctuary. A lock-tender caught between the demands of opposing bullies was on his own, his only support being the authority to assess a $20 fine against any captain who got too rambunctious. Canal regulations were incorporated into state laws and any "Canal Commissioner, engineer, superintendent, collector, or other agent" could collect penalties and forfeitures under $100, or go before a Justice of the Peace to obtain a summary conviction.

The careless handling of boats entering or leaving locks was a constant cause of squabbling between boaters and lock-tenders.

The plank facing of wooden locks could be splintered if a steersman misjudged the opening, and if a boat was not properly snubbed it could ram the gates at the far end of the chamber and shatter them so badly that to repair the damage navigation would have to be suspended for several days. The lock-tender was responsible for keeping his lock in good working order; boat owners were required to pay the cost of repairing damage caused by their vessels. The following item from the *Blair County Whig* of July 12, 1853, is typical of many such notices appearing in papers up and down the length of the canal: "A boat belonging to the firm of Bingham & Co., loaded with bacon, flour and hemp was sunk in the short level below Frankstown in this county on Thursday last. She broke the gates of the locks so badly that navigation was interupted for a few hours."

Though it was against regulations, the lock was a convenient place for boatmen to change horses. As the gunnel of a boat being raised or lowered came even with the top of the lock wall, a fresh horse was driven ashore and the tired horse brought back into the stable. This saved time and was simple compared to the nuisance of making an extra stop and running a plank to the canal side; but it was a dangerous trick and a horse that hesitated might break a leg in the maneuver or pile up at the bottom of the lock: hence the prohibition. This was the kind of rule enforced rigidly by one lock-tender and winked at by the next.

Operation of the locks soon developed into an art, and several English authors noted with surprise the speed with which boats were passed through. Captain Marryat in a *Diary in America* (London, 1839) wrote: "When the boat had entered the lock, and the gate was closed upon her, the water was let off with a rapidity which considerably affected her level, and her bows pointed downwards. I timed one lock with a fall of fifteen feet. From the time the gate was closed behind us until the lower one was opened for our egress, was exactly one minute and a quarter; and the boat sank down so rapidly as to give you the idea that she was scuttled and sinking." Actually, it took less time to raise or lower a boat from one level to another than it did to get the boat in or out of the lock chamber.

It took a boat going downstream about five minutes to get through a lock; upstream it took longer. Normally boats could be passed through the locks at eight-minute intervals, but it would have been impossible to maintain that pace for long without serious traffic jams. The boatmen themselves helped to speed up the locking process. Someone from the boat always leaped ashore to work the gates on one side of the chamber while the lock-tender managed those on the other.

In addition to the water that passed through each time a lock chamber was emptied, there was during most of the year a flow of excess water through the sluiceway that by-passed each lock. It was this flow of water that made locking operations possible all down the line. When there was sufficient water the lock-tender could speed up the passage of a downbound boat by briefly opening the paddles on the upper gate. With the help of the resulting burst of water the boat could get back into full speed in about 100 feet. Each lock-tender was responsible for the level of the water in the reach immediately below his lock, while the upper level, from which he drew his supply, was in charge of the man next above him. The canal commissioners received a letter from their superintendent in Pittsburgh, under date of January 6, 1838, advising them that he had appointed Adam Sturner to be the keeper at lock number 14, in place of John Seabird, "who was removed in consequence of not keeping his level up." On another occasion, William McLean was removed from his job at lock number 5 outside Pittsburgh; the objections to Mr. McLean were that "he permitted boats, flats etc., to pass his lock different times last faul (sic) with out first obtaining their clearance or permission from the Collectors at Allegheny Town - and also neglecting his level etc."

In the dry season, with scarely enough water in the channel to keep boats off the bottom, every drop of water was precious. Two or three boats would be kept waiting above the lock until boats appeared from below, so that one lockful of water would serve to pass a boat each way. At the same time a boatman was likely to trot in to report that his boat was stuck in the mud in the lower reach and beg for a burst of water to float it free.

A lift-lock and a river outlet lock were sometimes built side by side and then one lock-tender was expected to attend to both locks. This was the arrangement also where a sharp rise in the land level required two locks to provide the proper amount of lift. Double locks meant more work for the lock-tender and longer delays for the boatmen. On November 7, 1836, the superintendent of the Western Division wrote to the commissioners that "owing to increase of business on my division of the canal I found it necessary to authorize those Persons holding double locks to employ assistance which had been done."

When business was dull and only an occasional boat had to be locked through, the lock-tender's life was placid indeed. But when boats followed each other closely and everyone clamored at once for admission to the lock, the weary lock-tender could look forward only to freezing weather and the winter months when ice closed the canal; then, and only then, the man in the little white house beside the lock could depend on sleeping the whole night through without once being obliged to stumble out and work the gates for a trumpeting canal-boat.

Chapter X

MAIN LINE TRAVEL

A horse-drawn station wagon made the rounds of Philadelphia one morning in 1835, picking up passengers who had reservations for trips over the Main Line of Pennsylvania's public works. One of these, Philip Nicklin, as mentioned earlier, left an account of his travels in a little book titled *A Pleasant Peregrination Through the Prettiest Parts of Pennsylvania* and published under the pseudonym Peregrine Prolix. When Nicklin and his fellow travelers arrived at the Broad Street station they entered a railroad car, built to accomodate about 20 people, the seats being around the four sides and facing the center. Peregrine Prolix describes the start of the journey: "Two cars filled with passengers and covered with baggage are drawn by four fine horses for about four miles to the foot of the inclined plane, which is on the western bank of the Schuylkill, and is approached by a spacious viaduct extending across the river, built of strong timber and covered with a roof. The ride to the foot of the plane is very interesting, first passing through a deep cut made forty years ago for a canal that was never finished, and then by a number of beautiful country seats successively arranged on the eastern bank of the Schuylkill; affording occasional glimpses of the romantic river itself, and the lovely scenery on its western bank."

Nicklin's car was pulled by a stationary engine to the top of Belmont Plane. There he found a dozen or more cars being "strung together like beads" to make up a train. Soon the wheezing and puffing little engine started out with its load and, says Nicklin: "After many stoppings to let out passengers and let in water, and after taking into our eyes many enchanting views, and millions of pestilent triangular cinders, we arrived at Lancaster at 3 P. M. without accident or adventure."

It was customary for trains of the Columbia and Philadelphia Railroad to stop at regular 10-mile intervals so that the engineers with their long-spouted oil cans could lubricate the axles of all the cars, as well as the temperamental engines. At certain of these way-points inns sprang up to take care of the needs of the waiting hungry or thirsty travelers. In his *History of the Pennsylvania Railroad*, (Philadelphia, 1899) William Bender Wilson notes that "A trip from Philadelphia to Lancaster was one of pleasure. What accomodations! What stops! Paoli, with its pie and milk; Downington, with its coffee and big, fat doughnuts; and Lancaster, where Owen Hoppel dealt out pretzels, gingerbread, and a glass of the city's famous brew."

Nicklin makes no mention of gingerbread and beer at Lancaster, but perhaps he did not stop with Owen Hoppel. He was up and ready for the road early the next morning, however, and writes that "We left Lancaster at 5 A. M. in a Rail Road Car drawn by two horses tandem; arrived at Columbia in an hour and a half, and stopped at Mr. Donley's Red Lion Hotel." Presumeably the horses were unhitched from Nicklin's one-car train and it was let down the plane into Columbia by the stationary steam engine, though sometimes the hotels shortened the journey for travelers by meeting the trains with carriages at the top of the plane. "Here," said Nicklin, "is the western termination of the Rail Road, and goods from the seaboard intended for the great West are here transhipped into canal boats." And here Nicklin changed his mode of travel from the primitive tram-road to the much more comfortable canal.

Boats built primarily for carrying passengers were long, narrow, shallow-draught packets, designed to glide over the water with the greatest possible speed. These vessels were generally painted white, with the company's distinctive color displayed in a stripe just above the water-line. The largest boats were nearly 80 feet long and 11 or 12 feet wide, with a cabin occupying the entire deck to within six or seven feet of stem and stern. Along each side of the cabin were spaced from six to 12 windows, protected by green venetian blinds and almost without exception draped with red curtains. A few of the fancier boats had pipe organs. The interior of the cabin was divided into separate compartments for the stable, kitchen, ladies' dressing room, and gentlemen's cabin. If the company operated a relay system of horses, the stable was eliminated and a separate room set aside for the bar and possibly some sort of crew's cuddy. In any event, the gentlemen's cabin did triple duty as salon, dining room, and men's sleeping quarters. Head room was scarcely adequate even for men of average stature, since part of the boat's eight-foot height was taken up by the curved space under the deck. As a result, daytime activity in the men's cabin was largely sedentary: letter-writing, checkers and backgammon.

While the boat was making its way north from Columbia, past Marietta, Bainbridge, and Falmouth, there was no objection if in pleasant weather passengers took their chairs up to the roof-deck to get a better view of the scene and to enjoy the excitement stirred up by the boat's arrival in each small town along the way. Villagers and back-woodsmen had their opportunities, too, to observe the travelers dressed in the height of city fashion. At times there were even European tourists on board, arrayed in old-world finery. The ladies of the day wore massive bonnets, decorated with feathers and veils, their hair crimped and curled and piled high on their heads. The shoulders of their gowns were puffed out in the leg-of-mutton style and skirts flared from strangulated waists. The men wore high hats, forerunners of the stovepipes, high collars with fancy cravats, and coat collars that reached half way up the backs of their heads. Coats were slope-shouldered, high-waisted, and long-tailed, while pantaloons were tight, almost skin-tight.

Travelers had to be alert while on the upper deck to keep from having their heads thumped by one or another of the low bridges that spanned the canal; the roof was hurriedly vacated when the boat approached a bridge with minimum clearance. A passenger who tired of inactivity stretched his legs in a brisk walk along the towpath, where he had little trouble keeping abreast of the boat to the next lock where he could again get aboard. If the canal made a long sweep around the end of a hill, he could walk across the hilltop to admire the view and rejoin the boat on the other side.

Packets were designed to provide sleeping accomodations for 25 to 40 passengers. The *Pittsburgh* advertised that it had room for 150 passengers, but this number could not have been supplied with berths and the congestion and discomfort would have been as great as having that many people cooped up overnight in a modern four-room bungalow. In spite of the crowding, however, travelers found canal-boats cleaner and more comfortable than dusty, rough-riding stage coaches; and fares were reasonable. First class boats charged as little as $12 for the 395-mile ride from Philadelphia to Pittsburgh, and fare on line boats was only $6 for the same distance. Most companies had reputations for setting good tables and travelers were at times regaled with meals in which five kinds of meat and two sorts of fish were served. Breakfast and supper cost 25 cents each, while dinner cost 37½ cents. Such prices were prohibitive, of course, for the emigrant trade.

Emigrants, or immigrants, depending on whether they were seen coming or going, sought the most economical transportation. According to one early report "almost every summer day in the later 30's and 40's, groups of merry German immigrants in wooden shoes might be seen on the decks of the line boats going west from Harrisburg towards Ohio, Indiana and Illinois." They preferred line boats because to them cost was a matter of more concern than speed, and because they could carry along with them, in the boats' freight compartments, their baggage, bedding, household goods, and even some farm tools. Peck's *Emigrant's Guide* (Boston, 1837) had advised them that they would "find it to their interest always to be a little skeptical relative to statements of stage, steam and canal-boat agents, to make some allowance in their own calculations for delays, difficulties and expenses and above all, to *feel* perfectly patient and in good humor with themselves, the officers, company, and the world, even if they do not move quite as rapid and fare quite as well as they desire."

The faster-traveling packet boat reached Harrisburg about eight or nine hours out of Columbia, and a half-hour stop was made to let out and take in passengers. Four hours later the boat was approaching Duncan's Island, of which Nicklin gives the following account: "The scene around us was a combination of the magnificence of nature in her grandest and wildest mood, and of the ingenuity of art in some of her greatest efforts. The canal runs along the south-western side of a mountain, in whose basement of rock its bed is partly cut; and separated from the Susquehanna by an enormous wall of stone and earth, it debouches through a wide opening of solid masonry into the mighty river, here converted into a lake by an immense dam. As the boat entered the river, the horses ascended to a gallery high in air, attached to the side of a great bridge of timber, which here extends its numerous and expanded arches across the river, and thus drew us across the wide expanse of water." After re-entering the canal "on the south-western side of Duncan's Island, through a superb lock of solid masonry," and continuing along the island for a mile or so, Nicklin mentions crossing "the Juniata over a substantial aqueduct built of timber and roofed in." And then: "we had now reached a most romantic region, having the Juniata and the ever-changing scenery of its bold and picturesque banks constantly in view; now swelling into gentle hills, partly in culture and partly in woods; now rising abruptly into mountains, whose primeval forests seemed untrod by man; now subsiding into little plains and vallies occupied by villages and towns."

At some point earlier attention was given to the sleeping arrangements. Most travelers' accounts agree that at about nine o'clock in the evening members of the crew began bringing moveable berths, with sheets, pillows, and curtains, into the cabin. Passengers then went outside to the upper deck, or crowded into the center of the room, while the beds were made up. The berths, described as narrow wooden or metal frames about six feet long by two feet wide and covered with strips of canvas, were supported by iron rods fitted into holes in the walls, the outer ends being suspended on ropes from the ceiling, with three or four tiers fastened to each rope. Charles Dickens described the canal-boat sleeping accomodations in his *American Notes* (London, 1842) as "three long tiers of hanging book-shelves, designed apparently for volumes of the small octavo size." Philip Hone commented that sleepers were "packed away on narrow shelves . . . like dead pigs in a Cincinnati pork warehouse."

These berths, set closely together in layers around the sides of the cabin furnished moderately comfortable beds for 25 to 40 people, but the boats were habitually over-crowded and often many more passengers were jammed into a not-too-well-ventilated cabin. On some Pennsylvania Canal packets it was the practice to assign berths by lot, and after the traveler got his numbered ticket from the captain he hunted about until he found the berth with the corresponding number. He might consider himself fortunate to get an upper berth, or at least to find that no particularly fat person had the space immediately above his own. A variation of this procedure was reported by David Stevenson: "The distribution of the beds appears to be generally regulated by the size of the passengers; those that are heaviest being placed in the berths next the floor. The object of this arrangement is partly to ballast the boat properly, and partly, in event of a breakdown, to render the consequence less disagreeable and dangerous to the unhappy beings in the lower pens." When passengers out-numbered berths the men slept on the dining tables or on the floor, and if all of the *Pittsburgh's* "150 passengers" found room to stretch out, some must have been *under* the tables and others on the roof.

In their narrow beds, after the noises in the cabin had subsided, the travelers discovered that they could hear the gentle night sounds of the country, the crickets, the winds, the tree frogs. Now and then the distant clatter of hooves could be heard as the boat's horses pounded over a wooden culvert or aqueduct. When these sounds and the soft rippling of the water along the hull had lulled everyone to sleep, like as not a sudden blast on the steersman's horn brought them back to startled wakefulness. Heavy-booted feet were heard clobbering along the deck overhead as the boat was worked through a lock; and then quiet returned as the boat resumed its unhurried progress. By five o'clock in the morning everyone was up and scrambling for a turn at the sanitary facilities. Washing accomodations consisted of tin basins chained to the deck, with similarly safeguarded dippers for scooping the more or less stagnant water out of the canal. A common comb was available.

Dickens was rather scornful of American canal-boats, as he was of many things he saw on his American tour. "And yet", he wrote, "there was much in this mode of traveling which I heartily enjoyed at the time, and look back upon with great pleasure. Even the running up, bare-necked, at five o'clock in the morning, from the tainted cabin to the dirty deck; scooping up the icy water, plunging one's head into it, and drawing it out, all fresh and glowing with the cold; was a good thing. The fast, brisk walk upon the towing-path, between that time and breakfast, when every vein and artery seemed to tingle with health; the exquisite beauty of the opening day, when light came glancing off from everything; the lazy motion of the boat when one lay idly on the deck, looking through, rather than at, the deep blue sky; the gliding on at night, so noiselessly, past frowning hills, sullen with dark trees and sometimes angry in one red burning spot high up, where unseen men lay crouching around a fire; the shining out of the bright stars undisturbed by the noise of wheels or steam, or any other sound than the limpid rippling of the water as the boat went on: all these were pure delights."

Then after about 48 hours' travel from Columbia, past Middletown, Harrisburg, Clarks Ferry, Newport, Lewistown, Newton Hamilton, Huntingdon, and Williamsburg, the canal section of the Main Line came to a sudden end at the town of Hollidaysburg. Here transfer to cars was made for the trip over the Portage Railroad. Crossing Allegheny Mountain on the Portage was probably the most exciting part of a journey from Philadelphia to Pittsburgh. The 36-mile ride normally lasted seven hours because of the time required to pass over the 10 inclines. Fortunately for Dickens, he reached the Portage in the morning or he might have had a tedious wait, for the cars did not run at night. "On Sunday morning we arrived at the foot of the mountain, which is crossed by railroad. There are ten inclined planes; five *as*cending, and five *des*cending: carriages are dragged up the former, and let slowly down the latter, by means of stationary engines; the comparatively level spaces between, being traversed, sometimes by horse, and sometimes by engine power, as the case demands. Occasionally, the rails are laid upon the extreme verges of a giddy precipice; and looking from the carriage window, the traveler gazes sheer down, without a stone or scrap of fence between, into the mountain depths below. The journey is very carefully made, however; only two carriages traveling together; and, while proper precautions are taken, is not to be dreaded for its dangers."

On the summit level of the Portage, near the head of plane No. 6, Samuel Lemon operated a tavern that became known as the Lemon House, a large stone building, Georgian in style, that served as both inn and railroad station. For many years travelers were entertained there, until the tracks of the Portage were relocated along a different route.

Dickens continued to enjoy his ride. "It was very pretty travelling thus, at a rapid pace along the heights of the mountain in a keen wind, to look down into a valley full of light and softness; catching glimpses, through the tree-tops, of scattered cabins; children running to the doors; dogs bursting out to bark, whom we could see without hearing; terrified pigs scampering homewards; families sitting out in their rude gardens; cows gazing upward with stupid indifference; men in their shirt-sleeves looking on their unfinished houses, planning to-morrow's work; and we riding onward, high above them, like a whirlwind.

"It was amusing, too, when we had dined, and rattled down a steep pass, having no other moving power than the weight of the carriages themselves, to see the engine released, long after us, buzzing down alone, like a great insect, its back of green and gold so shining in the sun, that if it had spread a pair of wings and soared away, no one would have had occasion, as I fancied, for the least surprise. But it stopped short of us in a very business-like manner when we reached the canal: and, before we left the wharf, went panting up this hill again, with the passengers who had awaited our arrival for the means of traversing the road by which we had come."

When Nicklin made his trip over the Portage he thought the eastern slope of the mountain was "much more fearful" than the western side, the former having longer, and it seemed to him steeper, inclined planes. Even the ropes for hauling up the cars appeared to be of an "increased thickness." While Dickens either did not see, or was not impressed by, the Conemaugh viaduct, Nicklin gave it the full "Prolix" treatment. "The valley of the little Conemaugh river is passed on a viaduct of the most beautiful construction. It is of one arch, a perfect semicircle of *eighty feet,* built of cut stone, and its entire height from the foundation is seventy-eight feet six inches. When viewed from the bottom of the valley, it seems to span the heavens, and you might suppose a rainbow had been turned to stone."

Philip Hone's account of crossing the Portage dates from 1847. "June 14. - An extra car brought us from Hollidaysburg, at six o'clock this morning, to take the Portage railroad across the Allegheny mountains to Johnstown, - thirty-six miles, - which is effected by ten inclined planes, five ascending and five descending, similar to those of the Delaware and Hudson railroad. It is somewhat exciting, but nothing when we get used to it. The scenery of these mountains is astonishingly grand, wild beyond description; and would have been gratifying but for the hard rain and extreme cold, which compelled us to keep the windows closed. The delay of the early part of this tedious voyage still follows us. Being an extra train, nothing was ready; locomotives were to be sent for, and horses not to be had. We have lost already three days since we left Philadelphia, and while writing, the new boat, the "Louisiana", lies at the dock at Johnstown, waiting for the passengers who were a day behind us. Six o'clock. The cars are in; an influx of passengers, of not so good a description as the original set, have come on board, with a fair quantity of crying children and vulgar mothers, and we are off once again."

For at Johnstown canal travel was resumed. Pittsburgh was a good 103 miles and about 28 hours away. Nicklin enjoyed the slackwater sections of this part of the canal. "These pools", he wrote, "which abound in the inland navigation of Pennsylvania, are exceedingly beautiful, being one, two, or three miles long, and three or four hundred yards wide, surrounded by hills or mountains, forest covered, sometimes subsiding into a lovely cultivated vale embosoming a small village. There is scarcely a perceptible current, and when the air is still, the surface, mirror-like, presents an exact inverted picture of the scenery around. When the boat debouches from the narrow canal, she glides with more easy and rapid movement into the still expanse, passing the woods and air and water in sweetest silence, save the lulling sound of the tiny ripple at her bow."

As the journey continued the boat left one of these placid pools of the Conemaugh River to enter a hole in the rocky hillside. This was the 1000-foot tunnel that took the canal directly through a hill to avoid following the four-mile loop in the river near the site of the present Conemaugh flood dam. At the western end of the tunnel a beautiful stone aqueduct led the canal across the river again. Two hours more and Saltsburg was behind the travelers; another four and they were at Leechburg at the lower end of the last slackwater pool. From there it was a three-hour ride to Freeport and the mouth of the Kiskiminetas, where the Allegheny River was crossed by a wooden aqueduct. Then the canal turned sharply to the southwest. Pittsburgh was still about eight hours away.

According to Dicken's account "furnace fires and clanking hammers on the banks of the canal, warned us that we approached the termination of our journey. After going through another dreamy place - a long aqueduct across the Allegheny River . . . a vast low wooden chamber full of water - we emerged upon that ugly confusion of backs of buildings and crazy galleries and stairs, which always abuts on water, whether it be river, sea, canal, or ditch: and were at Pittsburg." It may be supposed there were people of importance ready to greet Dickens and to whisk him away to their homes for a spell of lionizing. Yet the fact is that he, like his traveling companions, had to look around the basin for a suitable hotel. Dickens and his wife found the Exchange Hotel to hand, and put up there, in room number 12 on the second floor, for their three-day stay. There were other hostels such as the Good Intent House at the corner of Liberty and Grant "near the canal, kept by Robert Craddock." In a contemporary advertisement the latter declared that: "This is the most convenient Hotel in the city, for persons who travel by canal, and the proprietor has fitted it up in a manner that cannot fail to please all who will favor him with their patronage. His stables are large and attended by careful Hostlers." The larger hotels were built closer to the steamboat wharf than to the canal, and among them were, in 1836, the *Pittsburgh Hotel, Mansion House*, and the *Ohio and Kentucky Hotel.*

Philip Hone arrived in 1847. "June 15. - Our canal voyage has been pleasant, on the whole, though tedious, and longer than it should have been by a day and a night at least, owing to delays on the first night, which we could not recover during the voyage. But we arrived at the 'Birmingham of America' at eleven o'clock this evening. I regretted the necessity of entering the city at night; but its appearance was quite a novelty: bright flames issuing from foundries, glass and gas works, rolling-mills, steam engines puffing like broken-winded horses, and heavy clouds of smoke making the night's darkness darker, gave us a grand *entree* to Pittsburgh, where we are sumptuously lodged at the Monongahela House."

Thus was the crossing of Pennsylvania by canal in the eighteen thirties and forties. Opinion about the accommodation and the scene and the other attractions of canal travel varied widely. Here is the authoress of *Uncle Tom's Cabin,* Harriet Beecher Stowe, writing in *Godey's Ladys' Book* (1841): "Of all the ways of travelling which obtain among our locomotive nation, the said vehicle, the canal boat, is the most absolutely prosaic and inglorious. There is something picturesque, nay, almost sublime, in the lordly march of your well-built, high-bred steamboat . . . But in a canal boat there is no power, no mystery, no danger; one can't blow up, one can't be drowned unless by some special effort; one sees clearly all there is to the case - a horse, a rope, and a muddy strip of water, and that is all . . .

"Let us not enumerate the manifold perplexities of the morning toilet, in a place where every lady realizes most forcibly the conditions of the old woman who lived under a broom - 'All she wanted was elbow room.' Let us not tell how one glass is made to answer for thirty fair faces, one ewer and vase for thirty lavations; and tell it not in Gath! one towel for a company! Let us not intimate how ladies' shoes have, in the night, clandestinely slid into the gentlemen's cabin, and gentlemen's boots elbowed, or rather *toed* their way among lady's gear, nor recite the exclamations after runaway property that are heard. 'I can't find nothin of Johnny's shoe!' - 'Here's a shoe in the water pitcher, is this it?' - 'My side combs are gone,' exclaims a nymph with dishevelled curls! - 'Massy! do look at my bonnet!' exlaims an old lady, elevating an article crushed into as many angles as there are pieces in a minced pye. - 'I never did sleep so much together in my life', echoes a poor little French lady, whom despair has driven into talking English.

"But our shortening paper warns us not to prolong our catalogue of distresses beyond reasonable bounds, and therefore we will close with advising all our friends who intend to try this way of traveling for pleasure, to take a good stock both of patience and clean towels with them, for we think that they will find abundant need for both."

The less feminine and self-conscious pen of the Englishwoman Harriet Martineau, writing of a trip on the Erie Canal in *Retrospect of Western Travel* (London, 1838), confirms Harriet Beecher Stowe: "I would never advise ladies to travel by canal, unless the boats are quite new and clean; or at least far better kept than any that I saw or heard of on this canal. On fine days it is pleasant enough sitting outside, (except for having to duck under the bridges, every quarter of an hour, under penalty of having one's head crushed into atoms,) and in dark evenings the approach of the boat-lights on the water is a pretty sight: but the horrors of night and of wet days more than compensate for all the advantages these vehicles can boast. The heat and noise, the known vicinity of a compressed crowd, lying packed like herrings in a barrel, the bumping against the sides of the locks, and the hissing of water therein like an inundation, startling one from sleep, - these things are very disagreeable. We suffered under an additional annoyance in the presence of sixteen presbyterian clergymen, - some of the most unprepossessing of their class. If there be a duty more obvious than another on board a canal-boat, it is to walk on the bank occasionally in fair weather, or at least to remain outside, in order to air the cabin, (close enough at best,) and get rid of the scents of the table before the unhappy passengers are shut up to sleep there. These sixteen gentlemen, on their way to a Convention at Utica, could not wait till they got there to begin their devotional observances, but obtruded them upon the passengers in a most unjustifiable manner. They were not satisfied with saying an almost interminable grace before and after each meal, but shut up the cabin for prayers before dinner, for missionary conversation in the afternoon, and for scripture reading and prayers quite late into the night, keeping tired travellers from their rest, and everyone from his fair share of fresh air . . .

"The appearance of the berths in the ladies' cabin was so repulsive, that we were seriously contemplating sitting out all night, when it began to rain so as to leave us no choice."

At best canal-boat travel in rain was a boring experience, there was little to be seen from the windows of the cabin but the endless monotony of banks rising on either side of the narrow ditch. In towns especially the canal was usually dug at a level low enough to allow the construction of the many necessary bridges as near street level as possible. As noted earlier, in order to enjoy the view, to get any real prospect of the country-side and town, passengers had to take chairs out to the upper deck or roof of the canal-boat. Even this vantage-point failed to satisfy everyone. "From the canal nothing is seen to advantage, and very little is seen at all", is the way Frances Trollope reports her impressions of a trip over the Erie Canal in her book *Domestic Manners of the Americans*

Erie Canal in her book *Domestic Manners of the Americans* (New York, 1949). She adds: "With a very delightful party, of one's own choosing, fine temperate weather, and a strong breeze to chase mosquitos, this mode of traveling might be very agreeable, but I can hardly imagine any motive of convenience powerful enough to induce me again to imprison myself in a canal boat under ordinary circumstanes." Yet a few days later she was again imprisoned.

During the two years Harriet Martineau spent in America from the autumn of 1834 to the autumn of 1836, she found the courage, even after her Erie Canal experiences, to travel east across Pennsylvania on the Main Line Canal. She noted in her *Society in America*: "Our party (of four, one a child) traversed the entire state from Pittsburg to Philadelphia by canal and railroad, in four days, at an expense of only forty-two dollars, not including provisions." A book used in the public schools, *Exploring Pennsylvania* (Harcourt, Brace & Co., 1953) mentions the Martineau trip and erroneously quotes this $42 figure as the cost of a single one-way fare! Miss Martineau continues: "There was then great competition between the lines of canal-boats. We went by the new line, whose boats were extraordinarily clean, and the table really luxurious. An omnibus, sent from the canal, conveyed us from our hotel at Pittsburg to the boat, at nine in the evening; and we immediately set off. Berths were put up for the ladies of the party in the ladies' dressing room, and removed during the day. We were called early and breakfast dispatched before the heat grew oppressive; but, though it was the middle of July, I could not remain in the shade of the cabin: the scenery, during our whole course, was so beautiful. Umbrella and fan made the heat endurable on deck, except for the two hours nearest to noon."

* * * *

"The valley of the Kiskiminites is like one noble fruitful park. Here and there were harvest fields of small grain, and of the tasselled Indian corn; and a few coal and salt works, some forsaken, some busy, showed themselves on reaches of the river: but we were usually enclosed by a circle of wooded hills, reposing in the brightest lights and shadows. The canal commonly ran along the base of one of these hills; but it often let us slip into the broad livid stream of the river itself.

"After having left the Kiskiminites behind us, we crossed the Conemaugh by a fine aqueduct, which continued its course through a long dark tunnel, piercing the heart of the mountain. The reflection of the blue light behind us on the straight line of water in the cavern made a beautiful picture. The paths which human hands have piled upon one another here form a singular combination: the river below, the aqueduct over it; and higher still, the mountain road, winding steeper and steeper to the summit. A settler lives on this mountain, the bottom of whose well was dug out in making the tunnel."

There is little direct record of canal travel, particularly on the Pennsylvania Main Line, apart from the sources quoted. Consequently, the pros and cons cannot be judiciously weighed. This lack of first-hand record suggests that to the public the novelty can only have been momentary and that, once adopted, canal travel was not looked upon as either unusual or particularly noteworthy. The evidence suggests that transportation by canal shared the disadvantages of most other types of travel, though it certainly belongs among the slowest of its forms. Slowness itself is obviously desirable or undesirable only in relation both to the traveler's temperament and to the traveler's object. Among advantages, however, canal travel clearly combined, even more sharply than river travel, the very real pleasures of land and water in close proximity. A characteristic feature of canal travel, in which it differs from most other forms of transport, is that, apart from facilities for eating, accomodation, and the like, it cannot be improved upon. It is severly restricted as to size of vessel, speed, and route. It is held both to its path and to its pace by nature and the terrain; and the more it attempts to circumvent these, the less satisfactory it becomes, until it breaks down altogether.

CHAPTER XI

Canal Troubles

The most aggravating problem in canal operation was water. Either there was too much of it or not enough. Freshets and full scale floods washed out embankments and filled up channels even before the Main Line was opened for business. Reasonable care had been taken by the engineers to provide adequate drains and culverts to carry off anticipated rainfall; but knowledge of water-sheds was limited and each year it seemed as if the severity of the downpours increased. So much rain fell on the 19th of June, 1838, that within a couple of hours the Juniata River swept away almost all of the canal locks, aqueducts, and river dams between Hollidaysburg and Huntingdon. It was the first of November, virtually the end of the season, before emergency repairs were completed and navigation resumed.

Though such great and dramatic floods attracted attention, it was the regular overflow of innumerable small runs and creeks that did the most costly damage in the long run. Wherever these water courses passed under the canal bed to reach a nearby river there was always the danger of a hole being torn in the bottom of the channel. Yet if the canal was at a lower level than the surrounding country the damage might be even more extensive. In such cases the water would be allowed to drain into the channel on one side and drawn off in waste-ways on the lower side. Flood water pouring into the canal always brought a great deal of sediment with it. This soon silted up the bottom so heavily that the entire level had to be drained and the excess mud shovelled out.

Slackwater sections of the canal, such as those in the Conemaugh and Juniata rivers, raised their own peculiar problems. Floods could and did sweep out the dams that created these deep pools, for such barriers were made of rather loosely cribbed timber filled with broken rock, gravel and earth. They were never of solid masonry. A heavy flow of ice was almost certain to carry away some part of any dam that stood in its way. If an unusually sturdy dam remained intact for a few years a different problem arose. The sluggish current of the slack pool allowed the sediment to silt up the bottom of that part of the stream. In time there would be insufficient clearance for boats in the normal channel, and the capacity of the pool as a stand-by reservoir was steadily reduced. Unlike regular canal sections, slackwater pools could not easily be drained and shovelled out. In such a situation an exceptionally cold winter with heavy ice, followed by spring floods, was something of a godsend though it caused the dam to be swept away, as long as the muddy channel was cleaned out at the same time.

For the first month or two after the opening of the canal in the spring, water for operating the locks was plentiful; the supply was large enough to run the wheels of numerous grist and saw mills along the way. Lock-tenders did not have to be concerned about maintaining proper levels of water in sections below their locks; the overflow was sufficient to keep each reach of the canal brim-full. By mid-summer, however, small streams began to run dry and reservoirs or feeder lakes had to be drawn upon for enough water to keep the boats up out of the mud. Measures then had to be taken to conserve water, such as the previously mentioned locking of boats through alternately. Mills dependent upon the canal for water power were shut down completely.

The engineers either overestimated the supply of water available at the summit levels of the canal, or underestimated the voracious thirst of a busy canal in operation. During August, September and October, there was at first seldom enough water for normal traffic between Hollidaysburg and Water Street a few miles downstream. Johnstown at the head of the Western Division also had its low water period. To overcome these seasonal droughts, new reservoirs were created by damming creeks in the hills above Hollidaysburg and Johnstown. Costly feeder canals were built to bring the additional water to the terminal basins. Even these did not entirely solve the problem. Hollidaysburg was too high for a dependable water suppply.

Shortage of water remained a perennial problem and the result was smaller cargoes at increased costs.

At best, canal operation was seasonal. Ice regularly stopped all traffic from sometime in December until late March or early April. There was an occasional rare mild winter of which boatmen bragged that only a few weeks were lost because of ice or high water. Stoppages or delays caused by floods, ice, or lack of water were recurrent annoyances. The railroad when it came, was a serious competitor more because of its regularity than because of either speed or advantageous rates.

In the drive to get the Main Line finished and open for traffic, some of the construction was deliberately flimsy or temporary. The first locks on the Eastern Division were built of solid stone masonry, but the nearer the canal came to its mountain terminal the more urgent were demands to get the through-line finished, slap dash if necessary. Many locks along the Juniata Division were wooden boxes backed with loose stone and, if needed, clay puddle. Aqueducts were mere long wooden troughs resting on stone piers. The public was naturally anxious to get its long-awaited transportation system into action. No harm would have resulted if there had been a consistent program for the replacement of these short-lived wooden parts of the work with good, honest, cut-stone masonry, but there was no program. When the sides of a wooden lock caved in, repairs were made as quickly and cheaply as possible. Much of the Main Line remained vulnerable to the rapid decay that attacks damp wood wherever it is exposed to the open air.

One of the most costly and vital parts of the public works was the wooden aqueduct that carried the canal across the Allegheny River to the Pittsburgh basin. By 1843 this important structure had been allowed to get into such disrepair that it could no longer be used, thus isolating Pittsburgh from direct connection with the canal. The state government was extremely short of cash, so the city of Pittsburgh was given authority to undertake repairs from its own resources and to collect tolls until the costs were recovered.

The contract to restore the aqueduct was taken by an immigrant German engineer named John Roebling. Roebling had developed a wire rope for use on the inclined planes of the Portage and this repair job gave him his first chance to demonstrate the strength of wire when used to suspend a heavy bridge. He placed a wire cable on each side of the aqueduct trunk to support part of its weight. These cables were seven inches in diameter and made up of wires an eighth of an inch thick, laid parallel and covered by a close, compact, continuous wrapping. This may have been the first application of wire rope in bridge construction. The repairs, begun in September of 1844, were completed in time so that canal-boats could enter Pittsburgh again in May 1845. Mr. Roebling's innovation was entirely successful and it launched him upon that brilliant career as a builder of suspension bridges which eventually culminated in the most famous of them all, Brooklyn Bridge. When the Allegheny aqueduct collapsed, finally, in 1861 it was the wooden trough that failed and not the ability of the structure to bear its own weight, as in the earlier collapse.

The greatest weakness of the Main line lay not in the operation of the canals but in the vital railroad link, the Allegheny Portage. It was first evident as early as 1836 that the Portage, though an amazing feat of engineering, was neither economical nor expeditious in handling a heavy volume of traffic. Alvin Harlow in his *Old Towpaths* (New York, 1926) called the Portage the "irremediable flaw in the main-line of the Pennsylvania Canal." It was a bottle-neck, as he pointed out, constantly clogged with accumulated freight, and with an operating cost so high that Pennsylvania rates could not compete with those of the Erie Canal.

The transfer of goods from boat to car at Hollidaysburg and back to boat at Johnstown added to the running time as well as to the cost. Leech & Co. claimed that under favorable circumstances "each transhipment may be effected in two and a half hours; but as the cars run only by daylight, if the boats do not arrive in season, nearly a day may be lost." The state furnished neither warehouses nor, in the early days of the railway, cars for transporting freight. The larger transportation companies supplied both, as well as the labor force to keep the goods moving. To the independent, unaffiliated boat operator the Portage was an impassable wall.

Aside from costly transfer operations, the Portage had many operational problems peculiar to its novel design. The Portage was a true child of its time: had it been built a few years earlier it would have depended entirely on horses for motive power, since satisfactory steam hoisting engines were not yet developed; five or six years later the demand would have been for a railroad suitable for the exclusive use of steam locomotives. The technology of steam was being mastered at a rapid rate during the first half of the nineteenth century. The Portage, though briefly a world wonder, was out of date before its last spike was hammered into place.

As many as 31 changes of motive power were required to move freight cars over the 36-¾ mile railway. A Stationary engine was needed to pull up or let down the cars at each of the ten inclined planes, and nine separate locomotives hauled the trains over the longer levels or grades. Teams of horses had to be kept available at 12 different points to pull the cars into place for coupling to the hawsers of the stationary engines and to take them over the two short levels. If section-boats were taken across the mountain two additional stationary engines were needed to pull the sections out of the water and lower them back in again.

The desperate attempt to avoid transfer of goods and even of passengers by use of portable section-boats seemed to promise faster and cheaper service, but it was only moderately successful. It was hoped that portable boats would not only do away with the need for warehouses, at the Johnstown and Hollidaysburg terminals, but would make it possible for the independent boat owner to extend his business from one end of the canal to the other. To keep the large companies from freezing out the small operators the state had to place its own cars on the Portage for transporting these independent section-boats, which reached their peak of popularity about 1845.

Modern histories of transportation, when mentioning the Pennsylvania Canal, commonly devote most of their attention to the Portage Railroad and its curious method of handling section-boats. An illustration of a boat being drawn up an incline is frequently reproduced. Actually the use of section-boats accounted for only a minor fraction of the total freight traffic, even in the best year, and section-boats for passenger service never got beyond the experimental stage. The method was far too cumbersome. During less than 15 years of use, being carried, boat, cargo, crew and all, from canal to canal, portable boats declined in popularity until they eventually disappeared. Their size, limited by the narrow clearance of the Portage tracks, meant smaller loads, higher rates, and lower profits.

The Columbia Railroad, at the eastern end of the Main Line, also required the burdensome transhipment of freight between cars and boats, or the awkward transportation of the section-boats. Its two inclined planes were vexatious bottlenecks that drove many shippers to patronize competing routes. For example, on March 20, 1836 the Pennsylvania and Ohio Transportation Company began scheduling daily passenger packets between Philadelphia and Pittsburgh by way of the Union Canal, the Pennsylvania Canal, and the Portage Railway, to avoid the Columbia Railroad entirely. The roundabout Union Canal route, with its small locks and chronic water shortages, could not have competed with the Columbia Railroad for passenger trade if the railroad had been moving its traffic with reasonable dispatch.

Philip Nicklin, whose account of a trip over the Main Line was quoted earlier, criticized both the design and operation of the Philadelphia-Columbia portion of the state works. He wrote: "The Columbia Railroad is made of the best materials, and has cost the state a great sum; but it has some great faults. The curves are too numerous, and their radii generally too short, in consequence of which the journey to Columbia (eighty miles) consumes seven or eight hours instead of four or five. The viaducts are built of wood instead of stone, and the engineer, doubting their ability to bear two trains at once, has brought the two tracks on them so close together as to prevent two trains passing at the same time. Thus . . . in several instances accidents have occurred from the collision of cars upon these insufficient viaducts. The roofs are so low as to prevent the locomotives from having chimneys of a sufficient height to keep the cinders out of the eyes of the passengers, and to prevent the sparks from setting fire to the cars and baggage. The chimneys of the steam-tugs are jointed, and in passing a viaduct the upper part is turned down, which allows the smoke to rush out at so small a height as to envelope the whole train in a dense and noisome cloud of smoke and cinders."

A more serious defect than any of those mentioned by Nicklin was the inability of the Columbia Railroad to handle the large volume of freight that waited to be passed to the east and west. In 1836, with the motive power then available, the capacity of the road was about 300 tons per day. It was hoped to increase this to 400 tons. The capacity of the competing Union-Schuylkill canal route was 3,000 tons a day. As the railroad was gradually improved, with heavier rails, sturdier bridges, more efficient engines, and larger freight cars, its capacity increased, and has kept on increasing right up to the present day.

On November 30, 1836, to avoid the plane at Columbia, construction was begun on a six-and-one-half-mile railway. It was completed by March 1840, but steps to eliminate Belmont Plane at the eastern end of the road were not taken for another ten years. After 1850 stationary engines were discarded and locomotives became the exclusive source of motive power.

Something similar was needed for the Portage if the state works were to compete with the new line of the Pennsylvania Railroad opened between Harrisburg and Pittsburgh in 1852. W. Milnor Roberts and Edward F. Gay, consulting engineers, reported to the canal board that year as follows: "It is so well-known to the Board that it is perhaps scarcely necessary for us to repeat that the present Portage Road is a worn-out Public Work, and that, for the proper economical accommodation of the increasing business seeking the state improvements, some efficient change is indispensable at the earliest possible period. The day for temporary expedients of any kind in a great work of this character has passed. The Old Portage, once the wonder of the age in which it was constructed, has done its work, and sound policy, as well as true economy, dictate that the Commonwealth should without the unnecessary delay of a single day, apply the most radical and perfect remedy."

What these two famous engineers were winding up to recommend so positively was the outright scrapping of the inclined plane system and the construction of a new road on which locomotives could be used over the entire route. They explained that the "whole length of the New Portage Railroad will be 45 miles - 18 miles from Hollidaysburg to the summit and 27 miles thence to Johnstown. The summit is 150 feet lower than the summit on the present road, which reduces the total ascent and descent 300 feet, and adds one-eighth to the working capacity of the road."

It is curious that although the engineers in 1830 thought they had located the lowest pass through the mountains, a lower one was found nearby in 1852; the original line of the Pennsylvania Railroad found a still lower summit, and the present rail-route, the fourth in the series, is the lowest of them all. The errors of the engineers are understandable in view of the wildness of the country at the time, and the extreme difficulty in making dependable surveys.

The strong recommendations of Roberts and Gay were favorably received by the legislature, and on July 1, 1855, the "New Portage", though not quite completed, was opened for business. No attempt had been made to increase the capacity of the canal sections of the Main Line. Pennsylvania was having far too much trouble with the railroad links of its system to do more than dream of expanding the capacity of the canal.

The locks and channel of the Pennsylvania Main Line Canal had been designed to accomodate boats of 75 tons burden, but in practice the average load carried was much below this rated capacity. Leech & Co., in 1855, reported that the "capacity of our boats, when fully loaded, is about sixty tons on the eastern division of the canal, and forty-two tons on the western division. The average load is forty-five tons on the Juniata, and thirty-five tons on the western division. The load of three boats to Johnstown is taken away by two boats from Hollidaysburg."

Things went much better on the Erie Canal. Ten years after that waterway was opened a program of gradual improvement was undertaken, and by the close of the Civil War, less than 30 years later, the Erie handled boats with loads up to 240 tons. While the capacity of its boats was being increased, toll and freight rates were being drastically reduced, as will be seen in the following abbreviated table:

Charges per ton on the Erie Canal

(From the State Engineers report for the year 1863)

	Albany to Buffalo		Buffalo to Albany	
Year	Toll	Toll & Freight	Toll	Toll & Freight
1830	$10.22	$20.00	$5.11	$9.07
1840	6.57	16.60	3.28	7.50
1850	4.80	7.20	2.92	5.48
1860	1.40	2.40	1.41	3.88

It may be seen from the above figures that hauling costs, exclusive of tolls, averaged slightly less than half a cent per ton-mile for freight moved the 350 miles between Albany and Buffalo in 1860. For comparison, Leech & Co. calculated its costs in 1855, exclusive of tolls, interest, and profit, at $4.40 per ton for the 395-mile haul between Philadelphia and Pittsburgh, "provided that back loading was available; otherwise the expense was doubled". This *net* cost, then, on a ton-mile basis, amounted to one-and-one-tenth cents, or more than twice the actual charges of the Erie Canal. About 10% of the freight cost on the Main Line was directly attributable to the transhipment of goods at the three rail-canal terminals. The remaining difference between basic costs on the New York and Pennsylvania systems was largely a result of the much greater capacity of the boats on the Erie Canal.

In *The Growth and Development of the Pennsylvania Railroad* (Philadelphia, 1927), written by the company's assistant terasurer H. W. Schotter, the statement is made that the state works "had proven a failure not only from the standpoint of the financial loss sustained by the state in constructing and operating them, but by reason of their inability to attract competitive traffic between the West and the Atlantic Seaboard. The principal reasons for the unsatisfactory results in operating these Works were the delays and inconveniences caused by the use of the inclined planes in crossing the mountains; the fact that the canals were closed by ice three or four months of the year, and that Spring operations were hampered by floods and freshets." Though not everyone would agree with Mr. Schotter that the Pennsylvania Canal was a complete failure, there can be no question but that the canal had its structural weaknesses.

The two railroad divisions of the Pennsylvania Canal, with their costly transfer points, made it economically unfeasible to carry through-loads of low-grade freight such as coal and iron ore. Attempts to improve these railways dissipated funds that might otherwise have been available for enlarging and improving the canal. Aside from the hermaphroditic nature of the rail-canal system, the canal sections of the Pennsylvania Main Line had greater physical obstacles to overcome than the New York route had. The 276 miles of canal in the two isolated sections between Columbia and Pittsburgh had 167 locks to provide a total required lockage of 1,168 feet. This meant that on the average a lock had to be passed every one and two-third miles. The Erie Canal originally had 83 locks in 363 miles and, after improvements were completed in 1862, had only 71 locks in 350.5 miles. Changes in elevation to be overcome by these locks amounted to a mere 654.8 feet. Boats on the Erie stopped, on the average, only once in every four-and-a-half to five miles. It had one famous "long level" of 69½ miles without a lock. Fewer locks meant fewer delays and lower operating costs. The relatively more difficult terrain of the Pennsylvania route, so lightheartedly ignored by the canal proponents in the early years, became a major problem as time went on.

It was not generally recognized that the shortcomings of the Pennsylvania Canal were inherent in its location and design. Josiah White's nephew Solomon W. Roberts, who served as an engineer on the construction of both canal and railroad sections of the works, put the blame on civil service or the lack of it. He wrote, in his *Reminiscences of the First Railroad over the Allegheny Mountains* (*Pennsylvania Magazine*, April 8, 1873): "My experience in the State service has convinced me that our form of government is badly adapted to the successful management of public works. Civil service reform might make some improvement, but so long as the tenure of office depends upon the frequently recurring popular elections, and the nominations are made by majorities in a party caucus, other considerations than those of honesty and fitness will very often determine the result. For the proper management of a railroad, strict discipline is necessary and the power of discharging employes is needed to insure prompt obedience. In the service of a corporation this is understood, but in that of the state other considerations are apt to interfere."

In recent years most references to Pennsylvania's canal era are found in books and articles dealing either with transportation in general, or with the Pennsylvania Railroad in particular. In either case writers quite uniformly point to state ownership, with its presumably crooked or stupid political management, as the major cause of the canal's difficulties. William Bender Wilson in his *History of the Pennsylvania Railroad* asserts that the "free-pass system originated on the State Works, and grew out of the assumption by public officials that they had a right to pass over the public highways, in going to and from the Capital, free of tolls. County officers soon claimed that they were entitled to the same immunity in going to and from their respective county towns, and political hangerson almost immediately enrolled themselves under the banner of free transportation, so in a short period after the public improvements were completed the free-pass barnacle was fastened on the transportation system of the State. It became a potent factor in corruption, and reached such an extent that transporters who would do certain political work at an election would have their tolls rebated to an extent that nearly always reached a refund of the entire amount paid." Wilson declares at another point that the "individual transporter who did not dance when the politican in charge of the road piped was placed at a great disadvantage. His cars were not moved until after his competitor, who was a partisan, reached market, classifications were interpreted against him, and his cars condemned by inspectors . . . . "

There is no question but that the canal commissioners were more generous in settling damage claims than were the relatively hard-boiled railroad claim agents who followed them. The commissioners knew that if they rejected a claim, or attempted to make a settlement unsatisfactory to the claimant, the case would, in all probability, be taken to the legislature in the form of a private bill. Such legislation usually instructed the canal board to "look into" or to "re-examine" so-and-so's claim; the implication that the plaintiff was to be given every benefit of the doubt did not escape the commissioners. A typical bill, passed in the 1842 session, declared: "That the canal commissioners be and they are hereby authorized, to examine the claim of James Anderson, for damages sustained in consequence of the gates of lock number twelve, at the head of Leechburg slackwater giving way while his freight boat was in said lock, and if they shall ascertain that the accident happened in consequence of a want of sufficient strength in the gates, and not from carelessness or misconduct on the part of those having charge of the booat . . ", well, the claim was to be paid. Every session had its quota of such private bills. In 1854 the canal board was to examine the claim of Arthur Roney of Blair County to determine if there had been neglience of canal employees in the loss of his canal-boat *Lydia* at Clarks Ferry, November 7, 1850; there was an act for the relief of Samuel Lemon, of Blair County, who seemed to feel that there might have been carelessness on the part of Portage employees in the destruction of eleven of his coal cars; and George Hazlette of Allegheny County thought he deserved damages because his horses were killed when the towpath broke down at the Deer Creek aqueduct.

Before bringing in a verdict against the politicians, however, it is only fair to give the defence its chance for rebuttal. In his message to the legislature on January 6, 1842 Governor Porter declared that: "Not a session of the Legislature passes without harrassing the Commissioners with investigations - the whole state is ransacked for accusers - every act is questioned and misrepresented, - and, after all, the result is fruitless. The first instance is yet to be found in which any thing tangible has been produced, or any salutary reform of the system effected." Those writing today, more than a century after the event, cannot assume an accusation to be true merely because it appeared in print: a truism that should not be discounted a hundred years from now.

The case against public ownership of the Pennsylvania Canal would be more damaging if the Erie Canal had come to the same sorry end, for no one alleges that Pennsylvania's politicians were more adroit in their chicaneries than those of New York. In fact contemporary charges of corruption made against the New York "Canal Ring" were numerous. Yet the Erie Canal prospered while the Pennsylvania Canal floundered along, unable to pay the principal or interest of its debt. It is true that revenues from the Main Line operations exceeded expenditures in every year except one, 1840. The surplus, however, never quite met the high interest on the original cost of construction. The balance sheet for the entire state canal program, with all of its incomplete branches, showed a still more serious deficit.

Governor Porter gave the 1842 legislature his analysis of the causes of the disappointingly low canal income: "That the public works should be unproductive, is owing in a great measure to a want of proper legislation on the subject, and unless this be remedied, it must impair public confidence in their ultimate utility. The Canal Commissioners have repeatedly urged upon the Legislature the propriety of allowing the Commonwealth, alone, to carry the passengers on the Columbia railroad. No railroad in the United States could sustain itself, if it were to relinquish the carrying of the passengers, yet, on that road, this strange condition of things is exhibited. The State has expended in its construction over four million dollars, while the capital employed by those carrying the passengers, is perhaps thirty thousand dollars. The State on her immense outlay, is reaping about three per cent, while the individual carriers, on their thirty thousand dollars are clearing nearly 200 per cent. So it is, also, with regard to the transportation between Philadelphia and Pittsburg. That line of our improvement, between those cities, was constructed at a cost of a fraction over fourteen millions of dollars. The transportation on it is monopolized by some seven or eight companies, employing a capital of less than one hundred thousand dollars; yet, while the State is receiving little more than will keep it in repair, the transporters are realizing immense profits, and that, too, on a comparatively small outlay." The problem, Governor Porter seemed to be saying, was one of too much private enterprise and not enough government ownership.

If the poor financial showing of the public works was the result primarily either of political bungling or of faults inherent in state ownership, the evident cure was to place the canals in the hands of private owners. This remedy was to be tried.

CHAPTER XII

Sale and Abandonment

Pennsylvanians had oversold themselves on the financial prospects of their state canal program. It was said and generally believed that the canals could be built entirely on borrowed money and that they would produce large profits so rapidly that not only would loan and interest be paid off but a handsome surplus would be returned to the treasury, to be applied against other costs of government. This was the initial and fatal pipe-dream of a public determined to move forward with insufficient patience and forethought and driven by an odd mixture of competitive pride and greed.

People saw for themselves that the canals were doing a thriving business and that they were operating at or near capacity. When money failed to pour into the treasury, and when taxes were demanded to meet payments on the debt, the public naturally concluded that their affairs were being grossly mismanaged. No one in authority had the courage to analyze the debt frankly and openly in terms of the unexpectedly high construction costs, the unwise expenditure of public money in ephemeral branch lines, and the accumulation of interest upon interest.

Many stories were told and re-told about graft and corruption in high places, some of which were greatly exaggerated, others undoubtedly true. It is unlikely that these stories were as disturbing to the electroate as the ersistent failure of the canals to pay their own financing charges. Each year, when revenue from tolls barely exceeded operating expenses, the same explanation was given: the disappointingly low income was the result of floods, of spring freshets, or of other accidents; receipts for the coming year would be much larger. Meanwhile interest on the canal bonds had to be paid out of taxes; and all taxpayers were not convinced that they were benefiting from and should be asked to support the canal transportation industry.

Few citizens appreciated the fact that there were many "hidden dividends" or indirect advantages deriving from state operation of the canal system. In the first place, even if income from tolls paid only for the normal maintenance and management costs of the canals, thousands of men made their living as employees of the canal board or of the various transportation companies. The money they earned was an important element in the business economy of the state. Secondly, the considerable profits made by the transportation companies themselves should reasonably have been credited as profit produced by the canals, even though they went directly into the pockets of private businessmen. Thirdly, merchants and manufacturers who benefited from low canal freight rates had no adequate basis for assuming that rates would have been as low or lower under private canal mangement. Low tolls, which meant low income for the state, meant also low freight rates for shippers and lower prices to consumers. Finally, the canal had immense sociological effects. U. S. Senator George T. Oliver, in an address to the Western Pennsylvania Historical Society March 18, 1916, pointed out that while "the building of the Pennsylvania Canal is generally looked upon as an unfortunate episode in the history of Pennsylvania, and while, considered as an investment, it was undoubtedly a losing one, it still had the effect of opening the country and of attracting to the western part of the state a sturdy population, most of whom otherwise might have gone West by the more favored route of the Erie Canal." These were not the kind of considerations popular at the time; the public was disillusioned, and drastic action was asked for. Sale of the canal network, however shortsighted, promised a quick relief from burdensome taxes.

The Act of April 29, 1844, according to its title, was "to reduce the state debt and to incorporate the Pennsylvania canal and railroad company." An offer was made to transfer the Main Line of the public works for "twenty million dollars, which same shall form the capital stock of a company to be incorporated as hereinafter provided." Among the provisions was "that nothing herein contained shall be construed to authorize the said company to engage in the business of transporting merchandise on said canals and railroads." The intent of the legislature was clear; the purchaser of the Main Line was expected to maintain and operate it as a public highway, much as the state had done.

Though the feeling that the canals had not been managed efficiently and that corrective action was needed was widespread, many persons protested bitterly against this move to place the public works in the hands of private corporations. To quiet this clamor, the question was finally submitted to the state's voters. The result of the referendum, held on October 8, 1844, was 149,748 to 124,598 in favor of selling the system. It is surprising that the majority was not larger, since so many of the voters lived distant from the nearest canal and had no connection with the public works except to pay taxes for its support, and since the franchise at the time was limited strictly to property owners and taxpayers.

No one came forward, however, with the $20,000,000 for the Main Line. Perhaps the price was too high. Perhaps private investors doubted their ability to get a satisfactory return from the canals even when operated by unhampered and efficient private enterprise. In a supplementary move to ease the state's financial burden the uncompleted Beaver and Erie Canal, on which the state had spent $4,500,000 and the little Wiconisco line, which had cost $300,000, were both given to private companies, to be finished and opened for business. The Wyoming line of the North Branch Canal from Wilkes-Barre to the New York border, would also have gone as a gift at the same time had the interested company fulfilled its commitments. Meanwhile strong efforts were made to persuade the legislature to rescind its offer to sell the Main Line, but apparently the people had had enough and the eventual retirement of the state from the transportation business was assured.

No one seems to have anticipated the abandonment of any part of the actual transportation system, for under the terms of sale in the 1844 law the purchaser was obligated to maintain the canals and railroads of the Main Line in good operating condition "forever". The incomplete Beaver and Erie and Wiconisco canals were given away to avoid further expenditure of state funds; but they were given on terms that required the new owners to finish and operate them. The Main Line with its rail portages and branch feeders still represented the basic means of transportation, though a competitor for public business and favor was soon to appear.

Railroads were attracting the attention of investors. The success of the new locomotives introduced between 1835 and 1845 challenged the imaginations of financiers, who quickly realized that railroads offered a monopolistic exploitation not possible with canals. Companies were being formed all over the country for the purpose of connecting cities and towns by steam railroads. Among them was the Pennsylvania Railroad Company whose sponsors proposed to build a rail line from Harrisburg to Pittsburgh, parallel to the state's Main Line for most of the distance. The company planned to build its tracks beside the canal wherever possible, not merely because this was the most practicable route across the state, but also because the waterway had nourished and built up the entire area through which it passed. If the railroad was laid through the same section, it would find business booming, passengers and freight waiting.

The charter was not granted without opposition from many of the legislators, for it was clear that the proposed railroad would be in direct competition with the state's canal system; but the promotion had the support of leading Philadelphia capitalists. Philadelphia's interest in the construction of a railroad to the west was in line with its long history of competition with the cities of New York and Baltimore. The limitations of the Pennsylvania Canal - Ohio River transportation route encouraged Philadelphia to look for better means of competing with her old rivals. The Baltimore and Ohio Railroad was completed as far as Cumberland and attempts were being made to extend it across southwestern Pennsylvania to Pittsburgh and the Ohio River. The prospect pleased Pittsburghers but threatened Philadelphia's commerce with the second crushing blow in the space of 20 years. A majority of the legislature was soon won over, and was to prove its friendliness on many future occasions. Authority to incorporate the Pennsylvania Railroad

Company was granted on April 13, 1846, and by March of the following year the original stock of $3,000,000 was oversubscribed and the company formally organized. The Baltimore and Ohio Railroad was blocked from reaching Pittsburgh, at least for the time being.

The charter allowed the new company to construct and operate a steam railroad line, to connect at Harrisburg with the Harrisburg, Portsmouth, Mount Joy and Lancaster Railroad, and to extend to Pittsburgh or to Erie, as the directors chose. The road was to be a public highway, the company to have "exclusive control of the motive power" and the right to make rules regulating such things as the size of wheels on cars furnished by other transporters. The legislature seems to have expected the Pennsylvania Railroad to function much as the state's Columbia Railroad functioned, that is, as a toll road with numerous individuals operating their own equipment over the company's track. As was customary, the state reserved the right to buy the railroad at the end of 20 years, if it wished. The company was required to pay the state five mills per mile on each ton of freight carried more than 20 miles. The tax was to be effective only from the tenth of March to the first of December, when the canals were normally in operation, and was levied to protect the state's canal investments. Subsequent amendments put this tax on a three-mill year-round basis, and eliminated the levy altogether on shipments of coal and lumber.

Rail laying was started promptly, and by September 1847 sixty-one miles of single track were in service between Harrisburg and Lewistown. The next year the road reached Hollidaysburg, where a junction was made with the state's Portage Railway. On December 10, 1852 the Pennsylvania Railroad, using the Portage route over the mountain, opened service from Harrisburg to Pittsburgh. A short time later all-rail connections were available between Philadelphia and Pittsburgh by way of the state's Columbia Railroad and the Harrisburg-Lancaster line. Passengers changed cars at Lancaster and Harrisburg, for the wide Pennsylvania Railroad equipment could not be taken straight through until a tunnel on the Harrisburg-Lancaster route was enlarged. Also the devil-strip between the east and west bound tracks of the road, as well as that of the Columbia tracks, had to be increased before the larger cars could be used for through passenger service.

The new passenger trains running on regular schedules immediately forced most of the canal packets out of business; the running time on the railroad was less than one-fifth of that on the canal for equivalent distances. On the Western Division the railroad trip from Johnstown to Pittsburgh took less than three hours, compared with 28 hours on the packets. The packets, of course, had a much longer run, down the Conemaugh and Kiskiminetas to the Allegheny at Freeport; the trains cut across through Greensburg and the Turtle Creek Valley. People living along the canal between Blairsville and Pittsburgh continued to make use of the canal packets until the railroad brought a branch into the area several years later.

J. Edgar Thomson, who learned railroad engineering on the state's Columbia Railroad, was the first chief engineer of the Pennsylvania Railroad and later one of its most famous presidents. Under his guidance the company established a shorter and easier route through the mountains than the one used by the state and by 1854 the railroad, its own line open, withdrew its business from the Portage inclined plane route.

Governor Bigler, who took office in 1852 when the Pennsylvania Railroad Company was rapidly closing the remaining gaps in its line between Harrisburg and Pittsburgh, had little thought of abandoning the canal system. The North Branch Division Canal was not yet completed to the New York line and the governor urged appropriations to finish the job. Though the work had been suspended for almost 10 years, the canal was so near done that many people thought it should be completed, both to save the state's investment and to open the route for the expected shipment of large quantities of anthracite to the north.

A new state-owned rail route was also projected, to replace the inclined planes of the Portage, probably with the idea of placing the state's Main Line in a better position to compete with the railroad company. Three years later and after several more million dollars were spent, both the North Branch Division and the New Portage Railway were completed.

With the opening of the privately owned through-rail line across the state in 1854, another effort was made to dispose of the public works. The Act of April 27th of that year offered the Main Line for sale at a minimum price of ten million dollars, half of the former asking price. The law still provided that the purchasers "shall be bound hereafter, to keep in good repair and operating condition, the entire line of said railroad and canals, extending from Philadelphia to Pittsburg, with the necessary toll houses, water stations, locks, buildings and other appurtenances, and that said railroads and canals shall be, and forever remain a public highway . . . . ." The operating company was not to be barred from engaging directly in the transportation of merchandise, as in the law of 1844, but it still was to provide the stationery engines and locomotives for the convenience of others "wishing to engage in transportation of tonnage or passengers." The legislature obviously expected that the Pennsylvania Railroad would be interested in the purchase, for provision was made in the law that if the railroad company was the highest bidder it should pay another million and a half dollars for the elimination of the tonnage tax. The railroad's owners either did not like the terms of the law or were too hard pressed financially at the time to make a bid and no offers were received from other groups.

Thus a period of intense rivalry opened between railroad and canal. The contest was not so unequal as might be supposed. Freight rates dropped so low that they provided little more than oats for the mules and coal for the panting locomotives. The single track railroad had been flimsily constructed with the cheapest rails on the market, and many accidents were caused by broken rails or faulty equipment. Reckless operation of trains over single track resulted in frequent collisions and damage claims mounted to fearful sums. The railroad management thought it vitally important to extend its line west to forestall the efforts of competing companies, but it was constantly plagued by losses on the completed portion of the road, aggravated by the need to compete with the state canal.

The canal commissioners in their report for 1854 avoided discussion of sale, and suggested merely that decisive action be taken to put an end to the suspense which was impairing the canal revenue. Their apprehensions were not unwarranted for several canal-boat operators who had been giving the railroad a hard fight were about to change sides. William Thaw, an ambitious young man who had made a rapid rise from shipping clerk to manager and part owner of the Pennsylvania and Ohio line, decided to sell his holdings and re-invest in the railroads of the Pennsylvania Company west of Pittsburgh. Another young operator, Benjamin Franklin Jones, who held a high position with the Mechanics' Independent line, also developed railroad interests. He later went into the iron furnace business with John Laughlin, to form the parent firm of the present Jones and Laughlin Steel Corporation. By 1855 there were only two important boat lines running between Pittsburgh and Philadelphia: the Pennsylvania and Ohio line and David Leech's Western Transportation Company, the latter one of the oldest in the business. These companies were then moving, between them, about 75,000 tons annually, both ways, or about one fourth of the amount they handled a few years before.

In May of 1855 the legislature, with the encouragement of newly-elected Governor Pollock, again offered the Main Line for sale, and on slightly more attractive terms than those of the preceding year. The purchaser was still required to maintain the entire route in good condition, and perhaps for this reason no valid offer was received. Probably as a counter-proposal, the Pennsylvania Railroad submitted the following letter:

"Office of the Pennsylvania Railroad Co.

Philadelphia, December 20, 1855

To the Hon. Andrew G. Curtin, Secretary of State:

Sir: - I respectfully submit on behalf of the Pennsylvania Railroad Company the following proposal for the purchase of the main line of the state improvements; also a proposal for the Columbia railroad only.

For the main line from Philadelphia to the Monongahela and Allegheny rivers, including the real estate, shops, tools, engine-houses, depots, locomotives, cars, toll-houses, lock-houses, water-power and other property connected there-with, the sum of seven million five hundred thousand dollars.

Payments to be made as follows: Five hundred thousand dollars on the delivery of the works to the company, in cash or certificates of state loan; ten per cent. of the remainder on the thirtieth day of July, one thousand eight hundred and seventy five; and ten per cent. annually there-after until the whole amount is paid. The installments unpaid to bear interest at the rate of five per cent. per annum, payable semi-annually on the thirtieth days of January and July of each year; the company to have the right at any time to pay off the whole or any portion of the purchase money, by the delivery to the State Treasurer of an equal amount in certificates of state loan; the state to relinquish her right to purchase the Pennsylvania railroad, and to repeal all laws imposing a tax on tonnage passing over said road.

The Pennsylvania Railroad Company will further agree to keep up the canal portion of the line east of the Allegheny mountain; also that portion of the line between Blairsville and Pittsburg, until the Northwestern railroad shall be open for business from Blairsville to the Allegheny river.

The company will also agree to purchase the Philadelphia and Columbia Railroad at its cost of construction, to be determined by three eminent civil engineers, to be appointed by the state with the concurrence of the Pennsylvania Railroad Company; upon which sum so ascertained, they will pay forever, semi-annually to the State Treasurer an amount equivalent to the dividends paid the stockholders of said company on an equal portion of its capital stock.

Very respectfully,

Your obedient servant,

J. Edgar Thomson, President"

In spite of the fact that the Pennsylvania Railroad Company was rather over-extended financially, because of its rapid expansion to the west, it was imperative that possession of the Columbia Railroad should be gained in order to have access to Philadelphia, New York, and other eastern shipping points. Possession of the Main Line Canal west of Columbia would eliminate costly competition and, it was hoped, the rapidly increasing tonnage tax. However, President Thomson's bold proposal to abandon the newly rebuilt Portage Railroad and, eventually, the Western Division of the canal, must have frightened the leaders of the state government, for though they were anxious to sell the canal system they had taken no steps to prepare the public for its dismemberment. In addition, there was real hesitation over the proposal to eliminate the tax on tonnage. for this tax was beginning to return an important sum to the treasury each year. While these and other matters were discussed behind closed doors, the Pennsylvania Railroad, in association with the Harrisburg-Lancaster line, was awarded on August 16, 1856 the contract for hauling all passengers over the Columbia Railroad.

The following spring, in the Act of May 16, 1857, the legislature capitulated and accepted the terms proposed by the Pennsylvania Railroad Company. The sale price was set at the suggested $7,500,000, with payments scheduled as the company proposed. The wording of the law was virtually copied from President Thomson's letter; the state's right to take possession of the road within 20 years of the granting of the charter was dutifully waived. The only deviation involved the elimination of the tonnage tax. Perhaps with the idea of making the Act a little more palatable to the voters, the railroad was asked to pay an additional $1,000,000 for the repeal of the tax. This was something of a bargain, since the tax then amounted to a million dollars in a five year period. To no one's surprise the Pennsylvania Railroad bought the Main Line on these, its own, terms, and took possession August 1, 1857.

Governor Pollock congratulated the people of Pennsylvania on being relieved of their property, and declared in a subsequent message that the "propriety of separating the State from the care and control of the public works is not only evident to all who have given the subject a candid and impartial consideration, but the necessity is clearly established by the history of their construction and management. They have failed to be a source of revenue to the Commonwealth, and if retained by the State will require an expenditure in their repair and management largely exceeding any revenue that, under the most favorable circumstances, can be derived from them." The year after the sale an Act was passed for the disposal of the remaining sections of the state's transportation system. Prices were set: the Delaware Division, $1,775,000; the North Branch Division. $1,600,000; the West Branch and Susquehanna divisions, $500,000. The lot went to the Sunbury and Erie Railroad Company as the sole bidder. The state was now completely out of the transportation business and by an amendment to the constitution was forbidden to construct railroads or canals, or to have any interest in either as a stockholder.

The arrangement to release the Pennsylvania Railroad from paying the tonnage tax was enjoined by the Supreme Court on an action brought by the canal commissioners. The court indicated grave doubts about the constitutionality of any taxpayer buying his way out of the requirement to pay taxes. Total payments made up to that time are shown in the following table:

Tonnage Tax Paid by the P. R. R. Co.

Year Ending	Amount paid
Nov. 30, 1851	$ 7,521.93
Nov. 30, 1852	16,680.49
Nov. 30, 1853	65,228.59
Nov. 30, 1855	129,230.56
Nov. 30, 1856	226,018.51
Nov. 30, 1857	179,933.75
Nov. 30, 1858	222,363.02

After 1858, no further payments were made. The Pennsylvania Railroad Company figured that since it was found unconstitutional to repeal the tax they would see if the tax itself could be found unconstitutional. Henceforth it was a question for the courts to decide. Governor Packer made some acidulous comments on the subject in his annual message for 1860, declaring, "I have not the slightest doubt, that the decisions, when had, will entirely vindicate the right of the government to impose the tax, and to compel corporations of its own creation to obey the law from which they derive their existence. When it is remembered, that the tax was originally imposed, in order to indemnify the State, to some extent, for losses which she was sure to sustain from a competition, which was inevitable, between the railroad authorized, and her main line of public works; and that this competition did, not only seriously affect the revenues of the Commonwealth derived from her public improvements, but ultimately induced the sale of the main line to the railroad company itself, at a price many millions of dollars below what it would have produced, in the absence of such competition, it is certainly not to be presumed that the Commonwealth will willingly yield her demand for revenue from this source, until she is, at least, fully indemnified for the pecuniary injury sustained in the depreciation of her own property, by her liberality extended to the company which now denies her power to enforce a contract, voluntarily entered into, upon a consideration entirely valid."

When in 1861 the courts finally came to a decision, $850,000 in unpaid taxes had accumulated, and the decision, was that the money must be paid! The legislature again came to the assistance of the railroad. It passed a law to repeal the tonnage tax, this time without requiring the incidental payment of a million dollars by the railroad, since this requirement had caused the former agreement to be ruled invalid. It went further, and directed that the unpaid tonnage tax accumulated up to that date be invested by the Pennsylvania Railroad in first mortgage bonds of six other railroads in Pennsylvania then in various stages of completion. The Pennsylvania Railroad Company showed some annoyance at having this money disposed of out of hand, but luck was with them, as was clear when the time came for these smaller roads to be absorbed into the Pennsylvania System. Repeal of the tonnage tax caused great excitement and bitterness in other quarters. Some even thought that the legislators had been unduly influenced by representatives of the railroad, but within six weeks Fort Sumter was fired upon and the public found other matters to worry about.

Governor Packer, like his predecessor, had reassuring thoughts for the public to this effect: "'Whatever differences of opinion may, at any time, have been entertained in regard to the propriety of the details of the legislation authorizing the sale of the main line or the branches, it can scarcely be doubted that the public welfare will, in every respect, be vastly promoted by the transfer of the management of the public works from the State to individual owners."

The Pennsylvania Railroad Company needed only three months to discover that the new Portage Railroad could not operate at a profit. Once the Portage was shut down, through freight could no longer be shipped over the canal route from Pittsburgh to Philadelphia. Since the railroad had completed its own route over the mountains two years earlier, it was of course in a position to absorb this business to the satisfaction of everyone except a few disgruntled canal-boat operators. The iron rails of the Portage were taken up almost at once and sent west to be used in finishing the new Pittsburgh, Fort Wayne and Chicago branch of the Pennsylvania Railroad. It was too late for protests or court action to save the Main Line.

The last two important transportation companies, Leech's and the Pennsylvania and Ohio line, ceased operations about the end of 1855. Thurston's Directory for 1856-57 lists only two firms as canal transporters, Kier and Mitchell, and Lemon and Loyd; these companies must have concentrated largely on Western Division business. The directories for 1858-59 and 1859-60 list only Kier and Mitchell but in the 1861-62 edition Kier and Mitchell have become fire brick manufacturers.

The ultimate fate of Pennsylvania's canals was no longer in doubt though, like the kind old lady who cut off her puppy's tail a little at a time so that it wouldn't hurt so much, the railroad closed them down by easy stages. The abandonment of the Portage isolated the Western Division and limited its use to relatively unprofitable short-haul business. In 1863 the 30 miles of canal between Blairsville and Johnstown was abandoned, and the next year the remaining section from Blairsville to Pittsburgh. In 1872 the 13 miles of canal between Hollidaysburg and Williamsburg went out of service. The 18 mile section between Williamsburg and Petersburg was allowed to dry up in 1875 and two years later there was no boating above Huntingdon. As the abandonment program advanced, long reaches of the old canal, by then a settled and picturesque part of the landscape, were filled in to provide road bed for additional railroad tracks.

Soon after the Main Line canal ceased to operate the people of Pittsburgh had reason to lament its loss. In 1858 the Pennsylvania Railroad established a schedule of rates on first class freight of $1.23 per hundred pounds between New York and Pittsburgh while the same goods could be shipped from New York to Columbus, 200 miles farther, for only $1.15, and clear to Cincinnati for $1.25. Pittsburgh merchants protested vainly; the railroad's officials explained that they were obliged to carry freight at the lower prices within the territory of competing lines. To give Pittsburgh the benefit of the same low rates would "deprive the road of the power to meet its liabilities." Had the canal remained in competitive operation, Pittsburgh would have had lower freight rates, but they would have been hidden and thus probably unappreciated dividends.

While the Main Line of the public works was being obliterated, the railroad's subsidiary, the Pennsylvania Canal Company, was buying more canals. In 1868 it took over the North Branch Division, between Northumberland and Wilkes-Barre, soon adding the Susquehanna and West Branch divisions, between Duncan's Island and Farrandsville. At the same time more capital was poured into the canals to deepen the channel and to lengthen the locks so as to allow the use of the big double-boats. These big boats, towed in pairs by a team of four mules, could each carry 130 to 150 tons of anthracite. Canals were desireable properties when they tapped the territory of rival railroad companies, and nuisances when they ran parallel to the Pennsylvania Railroad. As Assistant Treasurer Schotter deftly put it, if the canals "had been in the hands of interests inimical to the Pennsylvania Railroad company during the period of reduced rates for transportation, the result might have been detrimental to it."

Section by section, the state's canal system was bought up and discarded by interested railroads:

1. The Beaver and Erie Canal was sold by the sheriff in 1870 to the Erie and Pittsburgh Railroad Company, a subsidiary of the Pennsylvania Railroad. The collapse of an important aqueduct was excuse enough for closing the whole canal the following year.

2. The upper section of the North Branch Canal, from Wilkes-Barre to the New York state line, failed to get back into successful operation after the flood of 1865 and was abandoned

in 1872 by the Pennsylvania and New York Canal and Railroad Company.

3. The little Wiconisco Canal was operated by the Pennsylvania Canal Company from 1872 until 1890 when it was transferred to the North Central Railroad Company, another Pennsylvania Railroad subsidiary. It was in poor repair because of a bad flood the preceding year and was abandoned almost at once.

4. The West Branch Division, for most of its length, was abandoned by the Pennsylvania Canal Company in 1890 or 1891.

5. The Juniata Division of the old Main Line, as previously mentioned, did not operate beyond Huntingdon after 1876. In 1888 the piece between Huntingdon and Newton Hamilton was given up and the great flood of the following year put an end to all operations above Newport. In 1899 the Pennsylvania Canal Company decided not to make the repairs so vitally needed on the Juniata aqueduct and the Juniata Division went out of existence.

6. The lower line of the North Branch Division, the Susquehanna Division, and the last few miles of the West Branch Division below Muncy were virtually abandoned by the Pennsylvania Canal Company in 1901, though local operations continued on some sections for several more years. By that time the Pennsylvania Railroad had rail routes serving the same territory.

7. The Delaware Division, sturdiest section of the old public works and the most successful financially of all the state-built canals because of its tie-in with the Lehigh Coal and Navigation Company, was kept in operation, serving as the southern end of the Lehigh anthracite route, until it was deeded back to the state in 1931 to be used as a park. Josiah White's Lehigh Canal provided a steady flow of coal boats into the Delaware Division at Easton and it was this traffic, bound for Philadelphia, that kept the route in profitable operation for so many years. As one of the state works included in the sale of 1858, the Delaware Division fell into the hands of the Erie & Sunbury Railroad in

part of the deal by which that company, primarily interested in eliminating competition along its own route, acquired the canal properties it wanted in the Susquehanna Valley. In 1866 this railroad leased the Delaware Canal, for 99 years, to the Lehigh Coal & Navigation Co. Costly floods and mounting labor difficulties resulted in another deal in 1871 that turned over the management of the Lehigh's railroad and canal properties to the Central Railroad of New Jersey. The Central, in turn, ran afoul of its creditors and ended in 1877 under the management of the Lehigh Coal and Navigation Company.

The privately built canals were overtaken by a similar fate. The story of the death of the Pennsylvania and Ohio Canal, as told by Noble E. Whitford in his *History of New York Canals* (Albany, 1905), follows the familiar pattern: "This canal was designed to connect the Ohio canal with the Pennsylvania network of canals and was surveyed in 1827. It was constructed in 1838 by a company, a third part of whose stock was subscribed by the state. In 1852 the Mahoning railroad was built by a company whose stockholders were the owners of a large part of the canal shares. These stockholders obtained from the State of Ohio all stock in the canal held by the State, paying $30,000 and agreeing to keep the canal navigable. The railroad company, having obtained control of the canal, raised the tolls so high as to be practically prohibitive. As a result of this policy the entire traffic on the canal was thrown into the hands of the railroad. The neglect of the works had caused serious delay and, after lengthy legal procedure, the canal was formally abandoned."

The Susquehanna and Tidewater Canal fell rapidly into disrepair after it was leased to the Philadelphia and Reading Railroad in 1872. The Union Canal went to the block in 1885, and never got back into operation. The Delaware and Hudson died in 1899 with two railroads fighting over the corpse. Some of the other anthracite carriers hung on well into the present century, though during their declining years they served only as the "drip pans" that caught a little of the overflow from the coal hauling business of the controlling railroads.

In 1864 the Schuylkill Canal Navigation Co. entered into an agreement with the Philadelphia and Reading Railroad to divide the coal trade, 55% to the railroad and the remainder to the canal. Six years later, in 1870, the navigation company was in financial difficulties and leased the canal to the railroad for 999 years.

The Schuylkill Canal while under the management of the railroad was abandoned from a point above Pottsville to Schuylkill Haven in 1872 and from the latter point to Port Clinton in 1887. In 1916 the canal from Port Clinton to Hamburg was closed. Lock navigation was discontinued in the remaining link to Phoenixville in 1931 and the only freight hauled that year was 3,108 tons of culm taken on at Hamburg. Much of the preceding information on the Schuylkill was given to the writers by Mr. J. A. Fisher, president of the Reading Company, who has stated definitely that "the last commercial tonnage was hauled in 1931". Final disposition of this once great waterway came when, as Mr. Fisher said, "our Company deeded to the State of Pennsylvania the main stem of the Schuylkill Canal, in 1947."

A major factor in the gradual abandonment of the Schuylkill Canal was the large amount of coal-silt deposited in the channel from upstream coal-washing operations. Extensive dredging would have been necessary to keep the canal in operation.

According to a letter of October 13, 1954 the writers received from John M. Adams, Corporation Engineer and Real Estate Agent of the Lehigh Coal and Navigation Company, "The Lehigh Canal was used as a carrier until May 22, 1942 when a flood on the Lehigh River caused extensive damage to various sections of the canal and its appurtenant structures. Although there was not much action on the canal after 1920, portions of the canal were used until the time of the 1942 flood. The last captain on the canal was Allen Strohl of Walnutport, Penna., and his primary function was to haul coal dirt from Lockport (near Walnutport) to the New Jersey Zinc Company at Palmerton, Penna. While none of the locks are being maintained for boating (either pleasure or working), several of the locks are still in operating condition." In a subsequent note Mr. Adams reported that the section of canal between Allentown and Bethlehem is being maintained for industrial water supply, and in addition, four sections are under lease to sportsmens groups for recreational purposes.

From the information supplied by Mr. Adams it seems certain that the Lehigh was the last canal to function as a freight carrier and Allen Strohl the last man to captain a canal-boat anywhere in Pennsylvania.

Inasmuch as the abandonment of Pennsylvania's *state-built* canals took place without exception while they were under the control of private corporations, it scarcely can be argued that the decay of that once great canal system was the result of mismanagement by stupid or crooked politicians. Nor should it be supposed, because all of Pennsylvania's state and private canals vanished, that the canal as a medium of transportation had outlived its usefulness. To this day the Erie Canal operates as an important waterway for bulk shipments although it competes with the powerful New York Central Railroad along its entire course. Recently in Pennsylvania there have been a number of attempts to obtain a new canal for the transportation of coal and iron ore between Pittsburgh and Lake Erie. Such a canal would follow in part at least the route of the old Beaver and Erie Canal, which was allowed to die unlamented.

To survive, a canal must handle large bulk shipments at low cost; it must be strategically located between a source of such bulk loads and suitable markets; and, above all, it must avoid the deathly embrace of a railroad company. No Pennsylvania canal met all of these conditions.

Chapter XIII

CANAL REMNANTS

The Erie Canal, much enlarged and improved during its first century of operation, had become by 1925 the New York State Barge Canal, bigger, busier, and more prosperous than ever. Though many miles of branch canals withered and dried up the main trunk from Albany to Buffalo has so far withstood all direct attack as well as the behind-the-scenes maneuvering of its monopoly-minded competitors. Those other states which had been stimulated to build their own great canal systems following the opening of the Erie in 1825, had little or nothing to show for their effort when the Century of Canals came to its close. The last segments of Ohio's 1,000 miles of canal were put out of commission once and for all by the catastrophic floods of 1913. Indiana's feebler canal program died quickly after inhaling its first whiffs of locomotive smoke; and the canals of Illinois might have expired with the same faint-heartedness and unanimity but that one section became an important part of the ingenious scheme by which Chicago contrived to dump its reeking sewage into the Mississippi.

The year that marked a century of progress for the Erie Canal found less than 200 miles of canal still in existence in Pennsylvania of the 1,200 miles or more that had once been in operation. The Main Line was completely gone, and the only canals nominally open were the Schuylkill from big Blue Mountain dam to Philadelphia, and the Lehigh-Delaware Division from Lawry's about 20 miles below Mauch Chunk, to the outlet at Bristol on the Delaware. The Schuylkill Canal was some years by the Philadelphia and Reading Railroad Company more for the power and water it furnished to manufacturing plants than as a freight carrier. The Delaware

Canal was galvanized into new life of a kind when, on October 17, 1931, the state took title to a 40-mile stretch between Raubsville lock, five miles below Easton, and Yardly, 15 miles above Bristol, and established Roosevelt State Park, as a recreation center and memorial to the old canal days. The park is appreciated for its beautiful landscape and miles of shaded roadway, as well as its opportunities for boating, swimming, and ice skating. Visitors are reminded of the role the canal once played as a busy highway of commerce if they happen to catch sight of the canal-boat that carries excursionists on a restored three-mile section near New Hope.

A similiar park has been created along the lower reaches of the old Chesapeake and Ohio Canal by the National Park Service of the United States Department of the Interior. In 1938, the Federal government bought the entire right of way of the long-bankrupt Chesapeake and Ohio Canal Company, which had started out so bravely 110 years before to connect Chesapeake Bay with the Ohio River at Pittsburgh. It was a keen disappointment to many Pittsburgers that the canal never got west of Cumberland, Maryland, as they had hoped for two major routes to the seaboard. The Chesapeake and Ohio reached its peak of prosperity immediately after the Civil War and carried 850,000 tons of freight in one year. A disastrous flood in 1889 forced the company into bankruptcy and only a small section of the line remained in operation until 1924.

In 1940 the Park Service restored the lower division of the canal, extending 22 miles between Georgetown, D. C., and Seneca, Maryland. Hiking, canoeing, boating, fishing, picknicking, ice skating, and nature walks flourish in this 5,000 acre recreational area. Along the old tow-path are preserved the arched masonry underpasses or tunnels running beneath the canal at Foundry Branch, Fletcher's Boathouse, and Carderock. At Cabin John Creek, Widewater, and Great Falls, there are other impressive remnants of the work done by the skillful stone masons of the great canal building era. The old stone lift-locks and trim stone lock-houses, built more than a century ago, are now preserved in this "restored" section of the canal. Occasionally a canal-boat provides visitors with a kind of rubber-neck cruise along the canal. While it may be a synthetic pleasure to travel in such make-believe fashion, there is nevertheless a real satisfaction in moving so easily along the canal at the pace of our ancestors of those days when riding was as delightful as, if no faster than, walking.

Among the few old canals still in operation is the Delaware and Chesapeake Ship Canal. This route has recently been enlarged and deepened to permit the passage of modern costal vessels at tide level.

Today there are only a few scattered vestiges of Pennsylvania's once mighty Main Line Canal. The Eastern Division which, with its Susquehanna branches, was the last to be abandoned has almost entirely faded from sight. Several stone piers of Chickies Creek aqueduct are still standing, thanks to the many iron clamps that serve to hold the mortarless stones in place. At Middletown, where the canal commissioners once built a combined turnpike bridge and aqueduct across the Swatara, the old piers continue to support a highway bridge but their unused lower ends mark the former location of the adqueduct. The canal level at Steelton continues to function as a water carrier. River water is pumped into the channel below town and, a little disconcertingly, it flows in the upstream direction to reach the steel mill inlets.

The stone masonry of several Susquehanna Division locks looks sound; new wooden gates would probably fit them for duty again. The best of these is the Mahantango lock, known in the later canal period as lock No. 7. This lock is made of large, smooth cut-stones raised in massive walls almost 20 feet high and is a fine example of canal craftsmanship at its best. A double-length lock, it is designed to pass the big double-boats, but with provision for a set of extra gates in the middle to conserve water when a single boat was passed through. About a thousand feet from the highway, it is screened from sight by a grove of trees and defended by an extraordinarily pugnacious-looking black bull. In nearby West Mahantango Creek the old aqueduct pillars still stand and can be clearly seen from the highway bridge. Lock No. 5 at upper Liverpool, a few feet off the road, is of rubble-stone work and too much silted up to be impressive.

Until a few years ago the canal between Duncan's Island and Northumberland was filled with water for long stretches and looked much as it must have when the last boat came through half a century earlier. Most of the canal bed is now highway. Cars and trucks speed over the old right of way and only small stretches of the overgrown towpath and berm bank are left on either side of the road. Above Northumberland, on the North and West Branch canals, there are isolated stretches filled with water, such as the level maintained by a paper mill near Lock Haven. Such clear evidences of the old waterway are becoming increasingly rare.

The Juniata Division of the Main Line west of Lewisown ceased to operate several years earlier than the eastern end and, as might be expected, it has fewer identifiable remnants of the old works. Yet a stone abutment of the Three-Mile dam can be seen at Ganister and, nearby, the companion lock, now partly filled in and almost entirely concealed under the shed of a roadside stand. A series of three rather well-preserved locks on a farm at Lockport in Mifflin County are of rubble-stone construction.

East of Lewistown a mile or so is a fine cut-stone lock now hidden from view by a gasoline filling station. Motorists traveling the William Penn Highway can see the bed of the old canal along the river side of the road all the way from Lewistown to Mifflintown. If they look sharply they may occasionally find one of the stone culverts that carried a creek or run under the canal bed to the river. Passengers on the Pennsylvania Railroad can see from the train windows, as they near the junction of the Juniata with the Susquehanna, long sections of the abandoned canal bed and towpath directly beside the railroad tracks. They must look quickly, however, if they hope to spot the piers of the Juniata aqueduct which stand so defiantly in the river channel.

At Old Ferry, where canal-boats were pulled across the Juniata by an endless-rope contrivance, there is a well-preserved double-lift lock, a rarity on the Main Line. This lock, really two locks in one, used only three sets of gates to raise a boat through two different stages. The center pair served as the upper gates of the one lock and the lower gates of the other. The frame lock-house, weathered but intact, stands at the side of the lock.

Part of the stone work for the water mill that worked the rope ferry is still in place. Three islands in a line across the river are all that remain of the three piers that supported the cable of the ferry.

The slackwater crossing-pool at Old Ferry, as mentioned earlier, was formed by a dam. In 1896 the Pennsylvania Railroad Company decided to remove this dam, since it had backed water over their tracks during the flood of 1889. Mrs. Kurtz, who has a summer home on the Old Ferry property, told the writers that her aunt, Mrs. Nicholas Muhlenburg, sat on the dam day after day to prevent the railroad workers from blowing it up. The pool had become a recreation area for boating, fishing and swimming. The railroaders waited her out, however; she wearied of her crusade; and finally they had their chance to knock the dam down.

Newport along the south bank of the Juniata was in its day a famous canal town. Many canal-boats were built there and it was the home port for at least 40 boat captains and 100 or more boatmen. Newport's *Mingle House* has commemorated this phase of the town's history by decorating its dining room with maps and pictures of the canal and naming it the *Towpath Room. A Canal Room* with murals representing canal activities is in prospect. Aside from these rooms, and a Towpath Motel along the Susquehanna, there is little evidence to suggest that businessmen see any advantage in making use of the interest inherent in their locations along the historic Main Line Canal.

The former path of the Portage Railway over Allegheny Mountain can be traced with less difficulty than might be expected a full century after its abandonment. A state road now runs over several long sections of the right of way but here and there the old rail grade line can be seen slashing through the brow of a ridge or climbing steadily along the side of a bank. There are two very handsome stone-arched viaducts spanning narrow valleys along the route of the railway. From the center of the village of Lilly the main street appears to continue straight up the hill over what was once plane No. 4. Actually because of some conflict over the right of way, it goes unexpectedly around the hill instead of following the plane.

The Lemon House still stands, occupied and unnoticed, back up the hill from the William Penn Highway. It is a fairly large building, rectangular, presenting its back to the observer from the road and still oddly impressive in its decay.

Famous Skew Arch Bridge, by which the Huntingdon and Ebensburg Turnpike once crossed the Portage Railroad, has been preserved by the state in a small park along the William Penn Highway about nine miles west of Hollidaysburg. Here also is a tombstone-like marker commemorating the 100th anniversary of the opening of the Portage. The ten-foot monument, built with stone blocks taken from the summit level of the old Portage road-bed, is placed near what was once the foot of plane No. 6. Bronze plaques on the four sides briefly tell the story of the canal and portage. Additional stone blocks, once used to support the rails of the Portage, may still be found scattered across the mountain, sketchily outlining the former route of the railway; they were obviously missed by the scavengers when they cannibalized the line to build car shops in Altoona. The Portage tunnel, the first railroad tunnel in the United States, remains much as it was when the road was abandoned. It is difficult to carry off a tunnel.

One relic of canal days was the indirect cause of one of the world's worst peace-time disasters. Near South Forks, at the upper end of Conemaugh Valley, a small canal feeder-lake had been created by damming a creek. Following the abandonment of the canal, a group of sportsmen acquired the lake and enlarged it by increasing the height of its earthen dam. It was said that the sluice gate was removed at the same time to keep the fish from escaping. An unprecedented heavy rainfall on May 31, 1889 filled the lake beyond capacity and, when it overflowed, the normal spillway proved inadequate. Two hours after the water began to pour out over the earth-fill the dam disintegrated, sending a terrible wave of water rushing down upon the city of Johnstown, where 2,000 people were trapped and drowned.

Of the Western Division of the Main Line, the first to be abandoned, there are now few evidences. When the aqueduct across the Allegheny burst in 1861 and was left unrepaired, several canal-boats were stranded in the Pittsburgh basin. Later the basin was filled in and put to other uses. The stranded hulks must have been buried in the mud, for an article in the Pittsburgh *Dispatch* for August 17, 1911 noted that, 10 years earlier, when excavations were in progress for the Allegheny Phone Company building at Seventh and Pentland streets, the remains of an old canal-boat were uncovered. The stone arch carrying Federal Street across the canal, to the construction of which the canal commissioners contributed $1,500 in 1837, is believed to be still in place, though well buried under the present pavement.

The tunnel under Grant's Hill, which was sealed up and forgotten after the Pittsburgh basin was abandoned, is rediscovered periodically, whenever excavators chance to strike fragments of the old arch. When last examined the tunnel was still more or less intact, but draped with stalagmites and stalactites. some of which were 15 to 20 inches long. These appeared to be formed from the oozing of water through the limestone masonry itself, rather than from any materials in the surrounding soil. The tunnel carrying the tracks of the Panhandle Division of the Pennsylvania Railroad intersects the old canal works but follows a slightly different course through the hill. It is sometimes inaccurately stated that the railroad uses the canal tunnel.

Until 30 years ago, when the Emsworth dam permanently raised the level of the Pittsburgh river pool, the pier footings that carried the canal aqueduct across to Pittsburgh were plainly visible at low water stages of the Allegheny.

The Pennsylvania Railroad Company went to a lot of trouble to remove some of the more substantial canal remnants, like the dam in the Juniata at the rope ferry and the old stone aqueduct at Lockport, Westmoreland County. Residents of the Lockport area had been using the aqueduct as a bridge for a decade or more; there was no other highway bridge in the vicinity. James Riddell, a retired railroader of New Florence, says that his father Silas daily drove his wagon across the span to deliver clay to the Lockport brick yard. A few railroad workers appeared unexpectedly and began digging around the piers. When asked what was going on, they said they were strengthening the bridge. Actually, they were loading the piers with dynamite. Late one night they set it off. The first attempt fizzled out, but a second try provided a loud and satisfactory explosion. Dazed Lockporters rolled out of their beds to find that the entire aqueduct had been blasted into the river. Most of them were annoyed at the loss of their bridge. There was gossip that a competing railroad had planned to seize the aqueduct for a new line across the Conemaugh and that the Pennsylvania Railroad had destroyed the whole works to forestall the plans of their rival. A few years later when the Johnstown flood waters swept down the valley, residents in the area were glad the aqueduct was no longer there, for it would have backed up the water and flooded them all out. Today large blocks of quarried stone still litter both banks of the river just below the two railroad bridges, and mark the location of the abutments of the old aqueduct. Out in the stream itself the squared corners of a few old blocks continue to stand out of the water in defiance of 60 years of ice and flood.

Nearly every town and village along the canal once had its *Canal Street*, though many of these ghostly traces of the old waterway have been obliterated by the mania for numbering streets, or by ever-busy modernizers. North and South Canal streets, on what is now Pittsburgh's lower Northside, were so named because they followed the north and south banks of the canal through Allegheny town. There was also a Canal Street in the older section of Pittsburgh, which followed the canal from the tunnel to the corner of Fourth and Try streets, where the Pennsylvania Railroad's Fourth Street station now stands. All evidence of this street, and of the four locks that led to the harbor on the Monongahela, has disappeared under the railroad right of way. The tunnel itself is still remembered in the name of Tunnel Street. Other Main Line towns have similar relics of the old canal that, in many instances, brought their villages into being. Tarentum has its Lock Street to mark the location of the Western Division's lock number 8.

The map of Pennsylvania bears its own evidence of the state's early waterways. A great many ports, like Williamsport, Allenport, Smethport, Port Allegheny, and Port Matilda, acquired their names during the rafting days on the rivers, as did the havens of York Haven and Schuylkill Haven. Other places, like Lockport (there were at least five of these at one time), Lock Haven, Port Treverton, Tunnelton, and Shamokin Dam, got their names directly from local features of the Pennsylvania canal system. Portage and Summit took their names from their positions along the Portage Railway. There are hundreds of places too small to be found on most maps, with no post offices, and known only to local residents; such as Foot of Ten, at what was once the lower end of plane No. 10 on the Portage a few miles from the Main Line town of Hollidaysburg, and the nearby hamlets of Canal and Reservoir. Aqueduct, another Main Line village of a dozen or so houses, is near Duncannon at the mouth of the Juniata. Down the Susquehanna, below Wrightsville, is Long Level, named after a lockless section of the Susquehanna and Tidewater Canal. Well up the same river, near Pittston, are Lockville and Feederdam. The route of the Beaver and Erie Canal through Venango County is marked with a town called Canal, now a place of several hundred inhabitants.

Relics of a different kind may be found in various museums. The state museum in Harrisburg has interesting and well-made exhibits portraying the canal in operation and a section of the Portage with its inclined planes. In the basement and not ordinarily on display are a number of models of canal-boats including one of an O'Connor Portable Car Body boat. The Carnegie Museum of Pittsburgh also has several models of canal-boats on exhibition. One is a model of the famous *Pittsburgh*, possibly made by J. N. Hanna, former captain of the boat. Other models are of the *Jennie Bingham*, a Pittsburgh-Freeport packet, and a long slender section-boat; the latter is shown mounted on railroad trucks for carriage over the Portage. The museum also possesses an old Portage Railway lantern which early brakemen used for signaling. The lantern is square, with flat glass in each of the four sides instead of a rounded globe. Wire grills protect the glass much as in the railroad lanterns only recently supplanted by battery lights.

There are few surviving ballads about the Pennsylvania Canal. This may be largely because the last canal-boat sank in the mud of the last segment of the Main Line more than 50 years ago, and systematic ballad collecting has become fashionable only quite recently. There undoubtedly were ballads peculiar to the Pennsylvania Canal but nearly all have been lost, probably forever. The last of the canallers who followed the winding towpath in the later years of the waterway are about gone. Canal songs that found their way into print may yet be unearthed in old attics, newspaper files, or uncatalogued library deposits. One such find in the Grosvenor Library in Buffalo was a broadside ballad called "Paddy on the Canal", and harked back to the days of the bog-trotting diggers:

When I landed in sweet Philadelphia,
    the weather was pleasant and clear,
I did not stay long in the city,
    so quickly I shall let you hear.
I did not stay long in the city,
    for it happened to be in the fall,
I never reefed a sail in my rigging,
    'till I anchored out on the canal.

CHORUS

So fare you well father and mother,
    Likewise to old Ireland too,
So fare you well sister and brother,
    So kindly I'll bid you adieu.
When I came to this wonderful rampire,
    it filled me with the greatest surprise,
To see such a great undertaking,
    on the like I never opened my eye.
To see full a thousand brave fellows
    at work among the mountains so tall
To dig through the vallies so level,
    through rocks for to cut a canal.

I entered with them for a season,
    my monthly pay for to draw,
And being in very good humor,
    I often sang Erin Go Bragh.
Our provision it was very plenty,
    to complain we'd no reason at all
I had money in every pocket,
    while working upon the canal.

I learned for to be very handy,
to use both the shovel and spade,
I learnt the whole art of canalling,
I think it an excellent trade.
I learned to be very handy,
although I was not very tall,
I could handle the sprig of shillelah,
with the best man on the canal.

I being an entire stranger,
be sure I had not much to say,
The Boss came round in a hurry,
says, boys, it is grog time a-day.
We all marched up in good order,
he was father now unto us all,
Sure I wished myself from that moment
to be working upon the canal.

When at night we all rest from our labor,
be sure but our rent is all paid
We laid down our pick and our shovel,
likewise our axe and our spade
We all set a joking together,
there was nothing our minds to enthral,
If happiness be in this wide world,
I am sure it is on the canal.

Another of the "Paddy" series appeared in the Ebensburg *Sky* of July 21, 1831, entitled "Paddy's Visit to a Canal Letting". It ran, in part:

Och! Who in this wide world has been to a lettin'!
At Beaver, or French Creek, or no matter where.
By the pow'res, you'd think that yourself was just gettin'.
Right smack in a meskeagh at Kilkenny Fair.
It is there you'll find paddies and dutch without number,
And yankees, devil take one and all of the set,
And bed bugs like bull dogs to bother your slumber,
Whilst not a bed for your body's swate sowl could you get.

Modern ballad collections sometimes include a half dozen songs from the horse-boat days of the Erie Canal. These are pretty much of one pattern, parodying ballads of the sea, and poking fun at the tame sort of sailoring practiced on the canals. It is difficult to say whether the "Raging Canawl", the "E-ri-ee", and others in this group were truly indigenous to the canal or were composed by professional entertainers. What songs did the steersman sing to while away the long monotonous hours at the tiller? Were they songs about the daily work, or popular songs of the day? It's anybody's guess, but there is reason to believe that any songs originating among the canallers themselves would have been crude and perhaps unprintable.

During the last decade of the Main Line's existence, Stephen Foster, whose father had been the first toll collector at Alleghenytown, was writing songs that everyone was singing, like "Oh, Susanna", "Camp-town Races", and "My Old Kentucky Home". A Foster song that must have been popular with canal-boaters because of its special significance to them was "Hard Times, Come Again No more", which appeared in 1855:

> 'Tis a sigh that is waffed across the troubled wave,
> 'Tis a wail that is heard from the shore,
> 'Tis a dirge that is murmured around the lowly grave,
> Oh! Hard Times, come again no more!

Nine years later, in 1864, a sad procession carried the song writer's body out past the old Pittsburgh canal basin to the family burial ground. That year also, the water was drained from the Western Division of the old Main Line Canal for the last time, and the canal boat-men, with scarcely a backward glance, hurried to get in line for jobs on the railroad.

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